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EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the *Railroad Gazette* is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the *Railroad Gazette*, together with additional British and foreign matter, and is issued under the name *Railway Gazette*.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, SEPTEMBER 28, 1906.

If any one wishes to try to keep in mind an accurate image of the magnitude of the railroads of the country and their business it is necessary, usually, to tell him to do a lot of careful studying, comparing and memorizing; so easy is it to get such a top-heavy memory-load unbalanced. But the report of the Interstate Commerce Commission that is issued this week has one or two landmarks that are easy. The gross receipts for the year—not the last fiscal year, but the one before that—amount to two billions. We should like to be able to say that the receipts per mile were ten thousand, and therefore equally easy to remember; but they were only \$9,598. At the present rate of increase, however, if it keeps up, the ten thousand mark will be reached in less than two years. Though new railroads are being built all over the country, the increase of traffic on existing roads is a far more important item in the financial world than what the new roads add. It is gratifying to see, also, that during the past five years earnings per mile have increased more than twice as fast as the capital per mile, indicating less water in the stock. The length of railroad in the hands of receivers is only 796 miles, almost too small to notice when surveying such a large field. Automatic car couplers and air brakes are still reported, but the figures are now of no particular interest, because they are so near 100 per cent. The usual space is given to statistics of deaths and injuries; but to readers of the *Railroad Gazette* these have little meaning, for we all know already what ought to be done to reduce the number of these casualties.

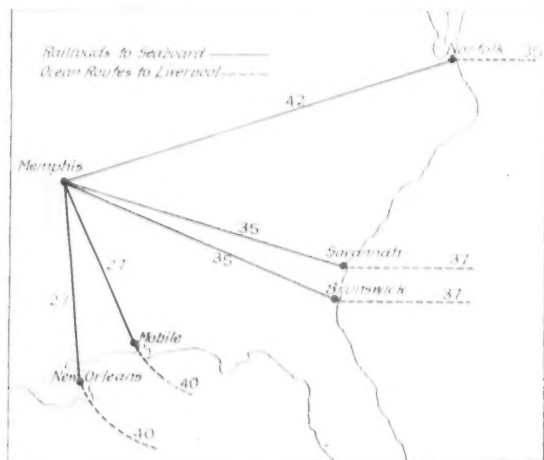
The Traffic Club of New York held its opening session on Tuesday evening, with a large representation not only of railroad traffic managers, but of the traffic managers of a number of industrial concerns as well. An interesting feature of the informal discussion was the bewilderment, apparently shared by all, as to the way the new Interstate Commerce Law was going to work out, and what it meant. One speaker, quoting the remark that language was a mode of concealing thought, congratulated Mr. Hepburn on his mastery of language; another was puzzled by the rate outlook; he did not know how to make rates any more, and had no place to turn to for enlightenment. Most significant of all was the belief expressed that, just as the agitation which led to the new law was begun by the shippers and fostered by the newspapers, it would take but a short time for the current of outspoken public opinion to become completely reversed, to the end that the shippers first, and then the newspapers would clamor effectively for re-

peal of certain portions of the law. It is probably safe to assume that these opinions would be upheld by traffic leagues in all parts of the country, even in the granger states, which for so many years have been foremost in hostile criticisms of their transportation systems. It is quite vain to hope that the tremendous, complex and often conflicting interests of shipper versus carrier and shipper versus shipper will ever be solved in this great country to the satisfaction of all. An unusually clear retrospect of some of these problems will be found in another column, in a liberal extract from an extremely readable and scholarly paper printed in the *Political Science Quarterly* by W. Z. Ripley, Professor of Economics at Harvard University. Yet we believe that Professor Ripley errs in advocating a rehabilitation of the long and short haul law as a remedy for the present economic wastes incident to our transportation system. The American railroad problem, as we see it, calls for the exercise of a considerable amount of Federal police power to prevent the unjust and extortionate practices roughly grouped under the names rebate and discrimination. The new Interstate Commerce Law provides this police power, but along with it there are introduced serious elements of inflexibility and complexity not less than that which existed heretofore. The trouble with Professor Ripley's plan and with what may be called the paternal parts of the Interstate Commerce Law is that the country is too big for them; if similar efforts towards law-ordained economics have failed in tight little England, how can we expect them to succeed in this great rambling country, with its separate state governments and its constant shifting of the producing and traffic centers? It seems clear that we need the police power without the paternalism, and if our railroads can be kept out of national politics long enough for the Hepburn experiment to clarify the situation, it seems probable that we shall get it.

RAILROAD RATES ON EXPORT COTTON.

The salient feature of the export cotton tariff order issued by the Interstate Commerce Commission and published in the *Railroad Gazette* last week is that a pretty good opportunity is given to the railroads to reduce rates, but practically none to raise them. Rates may be reduced on three days' notice; but having been put down they cannot again be put up except on 30 days' notice. This would seem to mean that the Commission believes that the railroads should as soon as possible get their rates down to bedrock and

then keep them there. So far as concerns the chief shipping point, Memphis, the following of this course by the railroads would throw the European business all to one line, that by way of New Orleans, the Illinois Central's railroad from Memphis to New Orleans being so much more favorably situated than the lines to the Atlantic seaboard that it could undoubtedly exhaust the others in an open war. What would be the effect on the cotton industry as a whole to thus kill off competition and perhaps injuriously curtail facilities we shall not here consider. We have not become sufficiently accustomed to Government-made rates to take readily to guessing in this line. But it seems quite clear that the only way to insure a choice of routes from Memphis is either to allow free competition, as in the past, or else for the Commission to establish arbitrary rates over each line; and the establishment of arbitrary rates would necessitate drawing a line at the seaboard, beyond which the Commission has no power, and the establishment of great warehouses there. Whether the Memphis brokers and shippers would find it necessary to move their offices to the sea we do not know; but so far as can be judged from the testimony that has been given concerning the facility with which the export trade is now conducted, any addition whatever to the burdens of storage, transfer or delays would be an additional dead load on the business, to be borne either by the farmer or the consumer; and probably the farmer, for the English market fixes prices. It is true that the export grain traffic from northern ports endures some burdens of this kind; but the two situations lack several elements of parallelism. The grain taken by the regular liners from New York is such a large proportion of the whole that the burdens of storage at that port are greatly modified; and at the other ports regular lines of steamers tend to steady the volume of ocean room available. At all the grain ports the use of cars as storehouses for long periods of time has helped to keep the grain trade out of trouble; but this is an illegitimate use of cars, and it would be a misfortune to introduce or spread the practice in the cotton traffic.



To make clear the Memphis situation, we have drawn the accompanying geographical sketch, showing the relative positions of the lines to the different ports. Only one line is indicated to each port, although to some of them there are competing lines. The figures shown in connection with the lines are the freight rates on cotton in cents per 100 lbs. to the several seaports and from all the seaports to Liverpool. The rail rate includes the cost of compression, which is, we believe, ten cents per 100 lbs. It will be seen that at the rates shown, the New Orleans route is the cheapest; the other roads, to get any of the export cotton, must carry it for less than these inland rates. This they do, making such reductions each day as the variations in the ocean rate may make necessary. For example, a road running to Savannah would have to accept 30 cents, instead of 35 cents, on a shipment going to Liverpool. Each day as the ocean rate is announced, the through rate is telegraphed from the railroad headquarters to the local agents at the shipping points. In addition to the necessity of adjusting the rates day by day, the freedom of the railroads is also limited by the number of vessels available; a road must take care and not accept more cotton than it can find ships for. There are no regular steamship lines, except from Galveston, New Orleans and Mobile.

Amicus Curia Stickney, in his long letter to the Commission, says that to continue the present free competition in cotton rates will foster the midnight tariff evil, and that if that evil is winked

at in the south it will soon have to be winked at in Kansas City. If the Commission can have the courage to consider the condition that confronts it, and not mind the theory, this bugbear need not frighten it, for the condition is that the Southern roads have for years made changes every 24 hours, with apparent satisfaction to all concerned, while the Kansas City roads were unable to do this without giving offense to some of the shippers. In other words free competition has in the south proved beneficial, while in the beef and grain business at Chicago and Kansas City there was so much secrecy or trickery, or both, that there was a demand for reform. Looking first and mainly at conditions, the Commission might well say that in the competitive cotton shipping cities changes every 24 hours, and without notice, should be freely allowed. Forbidding the making of changes except at some suitable fixed hour, say 9 a. m., would prevent any midnight jugglery.

The trouble is with our theory; the theory that all rates must be stable, and that what is good in Chicago or San Francisco must be deemed good in Memphis and New York, and all over the country. But theories usually have to give way to facts, and it is to be hoped that the Commission, in giving only temporary force to its present decision, is intending to put theories in their proper place in this cotton problem. With a little more frankness and fairness, it is quite possible that daily tariffs—midday, not midnight—would improve matters even at Chicago. That might meet Mr. Stickney's wishes as fully as could be done by his own plan, though in an opposite way. It is to be remembered that the satisfactory regulation of rates by a Government Commission is going to require a good deal more than \$70,000 worth of talent yearly, unless the Commission can contrive in some way to introduce a little automatic elasticity here and there. That is to say, with only seven men, the work will be too great, and government regulation will break down. Not even a short-sighted railroad man should desire to see that outcome, for, the experiment having been begun, we may as well have a real trial at once.

AMERICAN AND FOREIGN RAIL SPECIFICATIONS.

The fact that in recent years the output of American rail mills has been so greatly increased that it has been possible to meet the competition from abroad, and lay down rails in foreign ports is a matter not only of commercial importance but of technical value. In that European engineers have come to recognize the value of the American output and make concessions in the matter of specifications. At the London meeting of the American Institute of Mining Engineers, Mr. Albert Ladd Colby made this the subject of a paper, and called attention to the conditions under which American rails are delivered without any "general acknowledgment, on the part of foreign engineers, that their rail specifications must be modified if American tenders are particularly desired," although these modifications consist, for the most part, of concessions in the way of reducing the amount of tests that have no effect upon the quality of the output.

In a general way the specifications governing in American mills are fewer and more definite than those abroad. Foreign specifications are sometimes quite elaborate in their requirements, to an extent considered unnecessary in the United States, as the specification is and should be regarded as a contract by which the desired quality of rails may be produced with the least possible expense and delay to both parties.

"The gradual increase in the daily output of American rail mills during the last decade is not due to an increase in the speed of the rail train, prompted by a reckless desire for increased tonnage, independent of the quality, strength and finish of the product, but rather to radical improvements resulting in a much better balance between the producing and finishing ends of the mill. In the first place, the finishing train is used only for rolling rails, hence there are few delays due to roll changes; furthermore, the rail train is now kept much busier; the bars are brought more quickly and continuously to the rail train by the use of tables with rapidly revolving rollers; the blooming train is seldom idle, owing to the ample heating capacity of the modern soaking pits and the quick stripping and handling of ingots; sufficient air pressure is available to blow all the converters at once, if necessary; and, finally, there is always an excess supply of melted pig iron for the converters."

The variations in the present American and foreign specifications are marked, and are probably due in part to the methods of manufacture and in part to the national characteristics of the en-

gineers who have drawn them. In general, those of the United States require that the best current practice shall be followed, certain precautions intended to secure a sound rail being mentioned. Foreign specifications frequently mention the sources of supply of the raw material; a requirement which should, of course, be omitted or waived when applied to American mills, as well as that requiring the metal to be melted in air furnaces or cupolas before being run into the converters, since direct metal is almost exclusively used in this country.

In chemical composition there is a marked difference in the specifications on the two sides of the Atlantic, not only in the actual amount of carbon required but in the principle governing its proportion. In the United States, the lighter the rail the lower the carbon content, which ranges from a minimum of .35 per cent. in rails weighing from 50 to 60 lbs. per yard to .60 per cent. in those of from 90 to 100 lbs. In these there is usually an allowable variation of ten points, so that the possible range of carbon in the light rails would be from .35 to .45 per cent., and so on. In the foreign specifications, on the other hand, there is seldom any change in carbon or manganese with an increase in the weight of the section, where the maximum carbon is fixed at .50 per cent. with an allowable range of 15 points, except in the case of certain tramway rails where the maximum carbon content is higher and the range less.

The phosphorus content of from .075 to .080 per cent. required abroad is too low to be met by any of the American mills, except the one using foreign ores entirely, and has to be raised to .10 per cent. for American tenders. English makers of acid Bessemer steel rails can meet these requirements, because the Cumberland and Spanish hematites have less phosphorus than the American ores used here. So while phosphorus is conceded an undesirable element, careful heating and lower finishing temperatures can readily overcome this difference of .02 per cent. That this is so, is proven by the fact that the difficulties with the breakage of American rails on home or foreign roads has not been attributed to the presence of .10 instead of .08 per cent. of phosphorus.

The chemical analyses by which these determinations are effected are more elaborate and numerous abroad than they are in this country, where they are unnecessary; in fact, it would be quite impossible to apply them to American practice on account of the delays that they would involve through independent check analyses. The reason why such analyses are unnecessary here is that the direct metal used in our Bessemer converters is smelted from a uniform mixture of ores and the variation of phosphorus is small, while the "blowing is so constant and regular that temperatures vary, within narrow limits, and hence the silicon in the steel is practically constant." Therefore, check analyses are objected to by American makers, not only because the chemists of their own works are specialists in their line, but because it is considered unreasonable to specify that check analyses shall be made on rails and that the finished product "shall be piled into 500-ton lots until an analysis on one piece of rail is reported by some independent and probably far-distant chemist, who has been selected by the engineer."

The drop-test requirements of American specifications are exceedingly simple. A tup of 2,000 lbs. is allowed to fall once on the specimen from heights varying with the weight of the rail, and that on but one piece cut from every fifth heat at the hot saws. So that the requirement of one for each heat, where there may be as many as 125 in 24 hours, is not only unnecessary but a hardship on the inspector and manufacturer alike. Foreign specifications also require that the rail shall be bent to an angle of 110 degs. without cracking. This seems useless, for the drop test is merely a check against brittleness, and the fact that a section from an American mill will not show as much deflection as one from a British mill does not prove at all that it will be less safe or wear more rapidly.

American mills usually object to the tensile test requirements of foreign specifications, not only because they regard these requirements as unnecessary and the data so accumulated appears to be of no value, but because they are usually not equipped to do the work rapidly enough to keep up with the output, and because it is inconsistent to specify a given chemical composition for rails varying from 20 to 100 lbs. per yard, and require that they shall, at the same time, fulfill the same minimum elongation, in which no attention is paid to the more rapid cooling of the smaller section. These requirements may be further complicated by the fact that the specified tensile strength is often inconsistent with the speci-

fied elongation. Aside from the general uselessness of the test, the amount required is frequently prohibitive. For example, in a mill rolling 80-lb. rails at the rate of 2,000 tons in 24 hours, the output will be about 5,100 rails in that time. To meet some foreign specifications it would be necessary to make three tests for each 250 rails rolled, or 60 per day. Others require tests at the rate of 2 per cent. of production or 102 per day.

The static test also finds no place in American specifications, since, like the tensile, it is regarded as useless, though it appears in foreign requirements where it is used to determine deflection under load. The same statement holds regarding the bending test, although this is sometimes employed in the United States.

The practical adoption of the standard sections of the American Society of Civil Engineers, has so reduced the number in use in this country that little more need be specified than the limitation of weight variations, which is usually put at 0.5 per cent. for the entire order, and has been found to be sufficient to prevent any complaint on the part of the purchaser. Abroad there is usually a requirement that the manufacturer shall furnish templates of both rail and fish plates, and some even call for a short length of rail, prepared under ordinary conditions, while the rolling is not allowed to proceed until a written approval of this sample has been received from the engineer.

In regard to length, there is a universal recognition of 30 ft. and 33 ft. as the standard with an allowable variation of $\frac{1}{4}$ in. and a right to deliver 10 per cent. of the order in shorter rails. Abroad there are a number of standard lengths, and some specifications permit a variation of but $\frac{1}{8}$ in., which can only be met by cold milling and is here regarded as an unnecessary refinement.

The details for inspection are also very much simpler in America than they are abroad. Here the inspector is given free access to the works, and the maker knows that all inspection and tests will be made at the mills, and all disputes settled at once upon their merits. This agrees with foreign practice in so far as the access to the works is concerned, but there the maker is hampered by the necessity of paying for the inspection and tests by independent laboratories to any amount required by the inspector, thus introducing great uncertainty as to cost and complicating matters by the fact that the dictum of these laboratories may result in rejection without appeal. It is also required that rails shall be sorted into lots of uniform length before examination, involving rehandling, a condition impossible to comply with in this country. Again, it is regarded as unreasonable to require that all discarded rails shall be stacked and kept apart until the completion of the contract, and that none shall be sold or consigned until that time. Further requirements that are considered a hardship are those by which there is no appeal from the decision of the engineer, that rejections may be made after delivery and that the final acceptance shall be at the port of delivery; in other words, the maker is required to guarantee the delivery of his sales in good condition.

From the foregoing it will be seen that the elaborate specifications in force abroad must necessarily be modified in many particulars, which we regard as unimportant, but which may be regarded otherwise by the engineers by whom they were drawn. The apparent aim of the American specifications is to permit the production to go on with the least possible delay consistent with a high grade of rail; while it is also intended that the manufacturer shall not be hampered by useless requirements, nor the records clogged with a mass of worthless data. That the specifications meet the necessities of the case is evidenced by the high quality and satisfactory results obtained with American rails.

On the other hand, the foreign specifications enter into unessential details with bureaucratic minuteness and seem especially designed to establish the autocratic greatness of the engineer by whom they were drawn, and, through him, of the inspectors, who, at times, might well cause more trouble than their services were worth.

It is to be hoped, therefore, that the movement, now on foot, to establish a uniform specification for American rails intended for export, will meet with all the success it deserves, and that these minor and hampering requirements of the average foreign specification will be removed.

August Accidents.

The condensed record of the principal train accidents which occurred in the United States in the month of August, printed in another column, contains accounts of 24 collisions, 23 derailments and three other accidents. Those which were most serious, or which

are of special interest by reason of their causes or attending circumstances, occurred as follows:

	Place.	August	Killed.	Injured.
1.	St. Genevieve, Mo.	5th	0	20
2.	Silver Lake, Ohio.	5th	0	12
3.	Fruitland, Texas.	10th	0	55
4.	Rensselaer, Ind.	11th	0	12
5.	Fort Worth, Texas.	13th	2	12
6.	McCook, Ill.	13th	1	1
7.	Forney, Texas.	17th	0	6
8.	Sang Hollow,	19th	10	7
9.	Charlotte, Mich.	20th	5	10
10.	Fordham, N. Y.	29th	1	2

The most of these 10 accidents are notable more for the fortunate escapes of the passengers than for anything else. The collision at Sang Hollow is typical of a kind that is becoming so frequent enough in this country as to be liable to discredit the block system; collisions, we mean, occurring on block signalled roads but under suspension of the rigid rules which are essential to the success of the block system. Permissive blocking is no blocking at all; but the explanation why it is necessary or desirable to have permissive blocking is one that does not appeal to the public, and, therefore, a road which practises it is likely to suffer indefinitely in the estimation of the public. A road introducing the block system and allowing the frequent use of permissive signals finds itself in a somewhat anomalous position; in the use of the strict space interval it improves its discipline greatly by simplifying it, while in the general use of permissive blocking it makes the discipline of enginemen more difficult than before. Permissive blocking involves much running "under control," and "under control" is a term which has to be re-taught pretty often if the practice is to be employed with a satisfactory degree of safety.

The collision at Fordham, N. Y., on the 29th is notable because it occurred within the limits of New York city, where trainmen are arrested for slight causes. In this case the conductor and the engineman of the freight and the engineman of the passenger train were arrested by the police or the coroner (without warrants) on the assumption that they might be blameworthy for the death of the freight brakeman! This incident may have little interest to those of our readers who are remote from New York, though it may not be amiss for them to bear it in mind against the time when some foolish law permitting such illogical practice may be proposed in their own states. At the inquest in this case it was shown that the conductor of the freight in making up his train had connected up the air-brakes through only about one-third of the train instead of through one-half, as the Federal law requires; and it appears to have been held that this made him responsible for the damage done. While the conductor is condemned, and properly, for this disregard of the law, it is to be borne in mind that even with 75 per cent. of the cars air-braked, which would be a compliance with the Federal law as it now stands, damage from a break-in-two would by no means be fully provided against; it requires 100 per cent. to do that. To arrest a man on a criminal charge when the presumption is strongly against criminality is a grievous wrong; and this is only a sample of frequent occurrences in New York.

The number of electric car accidents reported in the newspapers of the United States in the month of August was 15, in which 11 persons were killed and 181 were injured.

Boston & Maine.

The year's business of this road, as compared with that of the previous year, shows considerable increases. Earnings from passengers (exclusive of mail, express, etc.), which furnish 34 per cent. of the total, were \$13,291,584 against \$12,530,472 in 1905, and total passenger train earnings, which make up 39 per cent. of all transportation receipts, were \$15,235,420 against \$14,291,615 in 1905. Freight earnings increased from \$21,800,000 in 1905 to \$23,800,000, and gross earnings were \$39,214,203 against \$36,213,246 in 1905. Thus, with an increase in passenger earnings of \$943,805 and in freight earnings of \$2,039,480, gross earnings were larger by \$3,035,454 than in the previous fiscal year. With this growth in gross receipts, operating expenses gained almost as much, being larger by \$2,733,628 than in 1905, which resulted in an increase in the operating ratio from 73.5 per cent. in 1905 to 74.85 per cent. in 1906.

The year's operating expenses, amounting to \$29,353,369, although so much larger than those of the previous year, include, with the exception of a charge of \$1,691,596 to capital account, the cost of all improvements and other expenditures made during the year, including \$1,076,427 for new equipment.

This policy of charging a large proportion of the expenditures for improvements to income has been in full force for the past six years, during which time, as a result, the operating ratio has risen from 70.8 in 1901 to 74.85 last year. The company makes a point of calling to the attention of its stockholders the aggregate spent on what are spoken of as the "nine fundamental items of yearly maintenance and renewal expenditure," the items being repairs of

locomotives, repairs of passenger train cars, repairs of freight cars, repairs of roadbed and track, steel rails laid, ties laid, maintenance of bridges, maintenance of buildings and structures, and reballasting track. The past year's expenditure on these nine accounts was \$7,844,692. On the same nine accounts six years ago (during which period there has been an increase in mileage of only 23 miles), there was spent the sum of \$5,645,809, showing an increase of \$2,198,884, or 39 per cent. since 1901 in these particularly important maintenance expenditures. The successful carrying out of this policy has, of course, been made possible by the increases in earnings during the six-year period, which are larger by \$8,460,668 than in 1901. So long as there is no setback in this respect, the general improvement of the road through liberality in the maintenance accounts will undoubtedly continue.

As set forth in the report for 1905, it had become clear to the management at that time that the road had outgrown the point where all necessary improvements could be made out of earnings. To that end, the directors recommended the adoption of a general financial plan under which, by the issue of new common stock, sufficient funds should be provided for more extensive improvements than could otherwise be met. As part of this general plan, \$3,627,500 par value, common stock, has been subscribed for by stockholders at 165, the price fixed for the issue by the railroad commissioners of Massachusetts, Maine and New Hampshire, and a further \$576,200, par value, is to be disposed of at public auction at such time as the directors shall decide. No large expenditures have as yet been made from the proceeds of this issue, except for new freight cars, for 4,000 of which contracts were this year placed. Work on the new motive power shops and various second track extensions authorized is to be begun in the spring of 1907. Grade crossing improvement work, the other announced purpose of the new funds, has been carried on during the year at a net cost of \$432,661, which, however, has been charged to construction account on the general balance sheet. Further expenditures of this character will probably be covered by the proceeds of the new stock issue.

The additions to rolling stock during the year include 55 locomotives, 44 passenger train cars, 23 caboose cars and 1,742 freight cars. The total expense of \$2,455,538 for this new equipment was divided between income and capital accounts at the rate of \$1,076,427 charged to the year's operating expenses (against \$807,782 in 1905) and \$1,379,111 charged to capital account.

The striking feature of the operating expense accounts is the large increase in conducting transportation, which amounted to \$1,547,723, or nearly 10 per cent. Almost every one of the subdivisions of this account shows an increase, particularly those which are made up of wage payments. For instance, engine and round-house men increased from \$2,566,000 to \$2,708,000, and switchmen, flagmen and watchmen increased from \$2,033,400 to \$2,187,100. Fuel for locomotives increased from \$4,241,969 to \$4,528,277. The collision at Baker Bridge, Mass., last November, in which 17 persons were killed and 30 or more injured, is responsible for the increase in the item injuries to passengers, which rose from \$128,000 in 1905 to \$455,000 in 1906.

Gross earnings per mile of road increased from \$16,082 to \$17,419 and net earnings per mile from \$4,192 to \$4,312. The net earnings per revenue train mile were 49 cents in 1904, 48 cents in 1905 and 47 cents in 1906. The rates received last year were slightly higher than in 1905, the average rate per passenger mile being 1.769 cents against 1.755 cents in 1905 and per ton mile 1.162 cents against 1.152 cents in 1905. In neither case, however, are the present figures up to the average receipts in 1904, when the passenger mile rate was 1.784 cents and the ton mile rate 1.178 cents.

The Boston & Maine, owing to the great concentration of its ownership in New England, has been one of the few large railroads which have kept in force the system of carrying stockholders free to and from its annual meetings. This year the announcement is made that, under advice of counsel that the new Interstate Commerce law definitely prohibits the custom of carrying stockholders to the meetings of the company free on presentation of their stock certificates, the directors are unable to authorize the transportation of stockholders to and from the annual meeting at any other than current transportation rates and by regular trains.

The Maine Central, which is the most important railroad system in Maine and which is controlled by majority stock ownership by the Boston & Maine, has also had a favorable year, gross earnings (\$7,794,745), having increased \$556,810. Net earnings were \$3,024,240 against \$2,567,097 in 1905, an increase of \$457,143. Owing, however, to a charge of \$828,000 against earnings for new equipment (this charge was only \$192,000 in 1905) and one of \$434,554 for various improvements (against a similar charge of \$350,000 in 1905), the net income after fixed charges was only \$404,587 against \$527,236 in 1905. The appropriations include \$100,000 in addition to the \$300,000 set aside in 1905 for terminal improvements at Bangor, \$71,551 for enlargement of the Thompson's Point (Portland) shops, \$103,500 for five miles of new second track now under construction, and \$160,000 for new ferry slips at Bath and Wool-

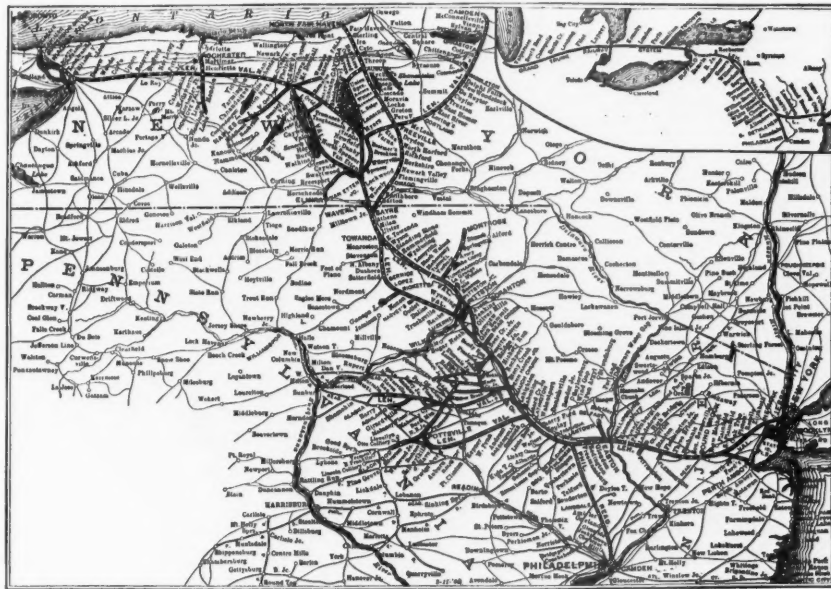
wich, the latter improvement to be finished during the present season.

For the Boston & Maine the principal statistics of operation are as follows:

	1906.	1905.
Mileage worked	2,288	2,288
Freight earnings	\$23,847,550	\$21,808,070
Passenger earnings	15,235,420	14,291,615
Gross earnings	39,214,203	36,213,246
Maint. of way and struct.	5,383,302	4,501,378
Maint. of equipment	3,339,013	3,396,380
Conducting transportation ..	18,965,030	17,117,397
New equipment	1,076,427	807,782
Operating expenses	29,353,369	26,619,740
Net earnings	9,860,834	9,593,505
Net income	2,188,205	2,019,857

Lehigh Valley.

The gross earnings of this company for the year ended June 30, 1906, were \$32,789,857, an increase of more than \$1,500,000 over the preceding year—this in spite of a decrease of \$281,772 in coal freight earnings which make up, on the average, almost exactly half of the company's traffic earnings. An increase of \$1,501,544 in other freight earnings and of \$461,567 in passenger earnings, with smaller increases in express and mail earnings, more than made up for this decrease. There was a decrease of \$208,000 in miscellaneous earnings, due principally to a decrease of over 100 per cent. in car service receipts and large decreases in the items of trackage and rents, brought about through the purchase and absorption of the Delaware, Susquehanna & Schuylkill, which had rented 133 miles of trackage. To offset the increase in gross earnings, operating expenses increased



Lehigh Valley.

over \$1,200,000, leaving net earnings of \$12,637,646, larger by \$291,505 than in 1905. The loss in coal freight earnings was, of course, due to the suspension of both anthracite and bituminous mining during April and May of this year. Without this interruption, the Lehigh Valley could hardly have failed to have had a year exceptionally prosperous—not that the year's results as they stand do not show prosperity, but that undoubtedly much better results would have been obtained had it not been for the labor troubles in the coal regions.

The Delaware, Susquehanna & Schuylkill Railroad, together with all the other property of Coxie Bros. & Company, Inc., came under the operation of the Lehigh Valley on November 1, 1905. This represented the acquisition of the most important independent coal producing interest remaining in the anthracite territory and was significant as showing the closer and closer monopoly of the coal lands by the transportation companies in control. The new mileage acquired amounted to about 50 miles of branch lines, the company having rented trackage rights over the main line of the Lehigh Valley from Penn Haven Junction to Perth Amboy for its outlet to tidewater. The purchase was financed by an issue of \$19,000,000 4 per cent. collateral trust bonds, with the stocks of Coxie Bros. & Company and the Delaware, Susquehanna & Schuylkill pledged thereunder as security.

Other financial operations of the year included the issuing of \$4,000,000 general consolidated mortgage 4 per cent. bonds, \$2,000,000 of which were used in refunding and the remaining \$2,000,000 held in the treasury. In return for advances made to cover the cost of building and equipping the new shops of the road at Sayre, Pa.,

the Consolidated Real Estate Company, formed for this purpose, made a mortgage securing \$2,600,000 of 4 per cent. bonds, all of which were turned over to the Lehigh Valley in full reimbursement for the amount advanced for such expenditure. In partial settlement for advances made during the year for the construction of the Lehigh & Lake Erie Railroad, the company's new terminal line at Buffalo, N. Y., \$620,000 of that company's first mortgage 4 per cent. bonds were turned over to the Lehigh Valley, making \$1,200,000 of these bonds received on this account to date. Besides this, the report states that "the amounts due from railroad and water lines in the Lehigh Valley System for advances on account of construction and new property, amounting at the close of the last fiscal year to \$5,498,067, have been reimbursed to the company by the issue of additional stocks or bonds of these companies. Your company, therefore, now owns securities in lieu of the book accounts representing the amounts which were from time to time advanced." While it is of no great importance so long as finances are in good condition by what method such advances to subsidiary companies are made, the advantage in the event of financial disaster or reorganization of having past advances represented in the treasury of the parent company by actual securities instead of by bookkeeping accounts is obvious, for in this way something more definite than a bookkeeping claim is in the hands of the controlling company.

Numerous improvements are being made to the property. The new shops, water pumping plant and reservoir at Sayre are now in operation, and the Lehigh & Lake Erie is to be ready for laying the last rails by the end of next September. Work on reducing grades and changing alinement on the Pennsylvania division—including a new and heavier double-track steel girder bridge over the Susquehanna river—is to be finished within a year, an improvement which will result in substantially increasing the average train load on this division. This is being done at an estimated cost of \$805,000. During the year the third track over the Wilkesbarre mountain has been extended 4.26 miles, at a cost of \$64,600, making a total of 11.16 miles of continuous third track which is used in facilitating the movement of westbound freight over the mountain. Third and fourth tracks from East Penn Junction to a point west of Freemansburg have been authorized at an estimated cost of \$247,300. The fourth track from Packerton to Mauch Chunk is now being extended to Glen Onoko, 2.3 miles, an improvement which, on completion, will relieve the Packerton yard and improve the movement of westbound freight. A new freight terminal has been established at 149th street, New York City, to serve the Harlem and Bronx districts. Three water tanks of 50,000 gallons capacity each, and one of 60,000 gallons capacity were built during the year. Additional real estate was acquired at various points, the principal purchases having been at Jersey City, Bayonne and Newark, N. J., and South Bethlehem and Wilkesbarre, Pa. This list does not include numerous less important improvements.

The total production of anthracite coal from lands in which the Lehigh Valley is interested was 7,667,665 tons as against 7,975,210 tons for 1905, a decrease of 3.86 per cent. The Lehigh Valley Coal Company and affiliated companies produced and bought 85 per cent. of the anthracite coal transported by the Lehigh Valley Railroad. The coal properties were improved by new breakers at Blackwood and Mount Carmel, and other improvements were made at a cost of \$621,323. New coal storage plants with capacities of 100,000, 200,000 and 375,000 tons respectively were built at Wende, Black Creek and Ransom, at a total cost of \$790,629.

Further examination of the income account shows that in addition to the gain of \$290,000 in net earnings there was an increase of \$355,000 in other income. From the total income of \$13,446,000 there was deducted for additions and improvements \$1,570,227. Net income was \$5,451,584, against \$5,392,889 in 1905. The net income from the Lehigh Valley Coal Company to be added to this was, however, \$317,000 smaller than in 1905, so that the total net income for the year was \$5,770,073, against \$6,028,437 in 1905, a decrease of \$258,000.

From an operating standpoint the year was not as favorable as 1905, largely owing to higher wages, increased cost of supplies, and the suspension of mining. With an increase of 5.21 per cent. in freight and 4.60 per cent. in passenger train earnings there was an increase of 7 per cent., or \$712,916, in the expense of conducting transportation. The average train load, however, shows a small increase of 3 tons, from 501 tons to 504. The average rate received (0.626 cents) was slightly smaller than the year before, but in comparison with the average rate received by bituminous roads shows how profitable an article of traffic from the railroad's standpoint is anthracite coal. When companies like the Chesapeake & Ohio and

the Norfolk & Western are able to make a profit from an average rate of somewhere around 4 mills it is natural to expect favorable results on a road like the Lehigh Valley with an average revenue per ton mile of over 6 mills.

Maintenance of way cost \$2,207 per mile, against \$2,347 in 1905. Maintenance of equipment cost \$3,020 per locomotive in 1906, against \$3,150 in 1905; \$685 per passenger car, against \$695 in 1905, and \$61 per freight car, against \$51 in 1905, the last figure being a noteworthy increase, particularly in view of the large amount of new equipment recently placed in service.

The principal statistics of the year's operation are as follows:

	1906.	1905.
Mileage worked	1,429	1,393
Coal earnings	\$13,248,565	\$13,530,337
Other freight earnings ..	13,934,127	12,432,583
Passenger earnings	3,971,392	3,509,825
Gross earnings	32,789,857	31,275,843
Maint. way and structures	3,153,245	3,269,383
Maint. of equipment	5,485,794	4,894,269
Operating expenses	10,891,954	10,179,038
Net earnings	20,152,211	18,929,701
Total net income	12,637,646	12,346,141
	5,770,073	6,028,437

Chicago Great Western.

The Chicago Great Western is an American railroad organized, so far as its finances are concerned, largely on the English model. It is made up of three parts, the Chicago Great Western proper, with 818 miles of operated line, including the main stems to Chicago, St. Paul and Kansas City; the Mason City & Fort Dodge, a proprietary road operating 386 miles of line, including the Omaha main stem, and the Wisconsin, Minnesota & Pacific, another subsidiary company having 271 miles of road made up largely of branch lines in Minnesota. The Chicago Great Western owns all the stocks of the two subsidiary companies, having issued its own stock in exchange. Separate accounts are kept for the two smaller companies and the surplus from operation of each company after payment of all operating expenses and charges belongs to the Chicago Great Western. To the extent of such surplus earnings as have been received by the parent company from each of the subsidiary roads, the Chicago Great Western guarantees the future payment of their bonds.

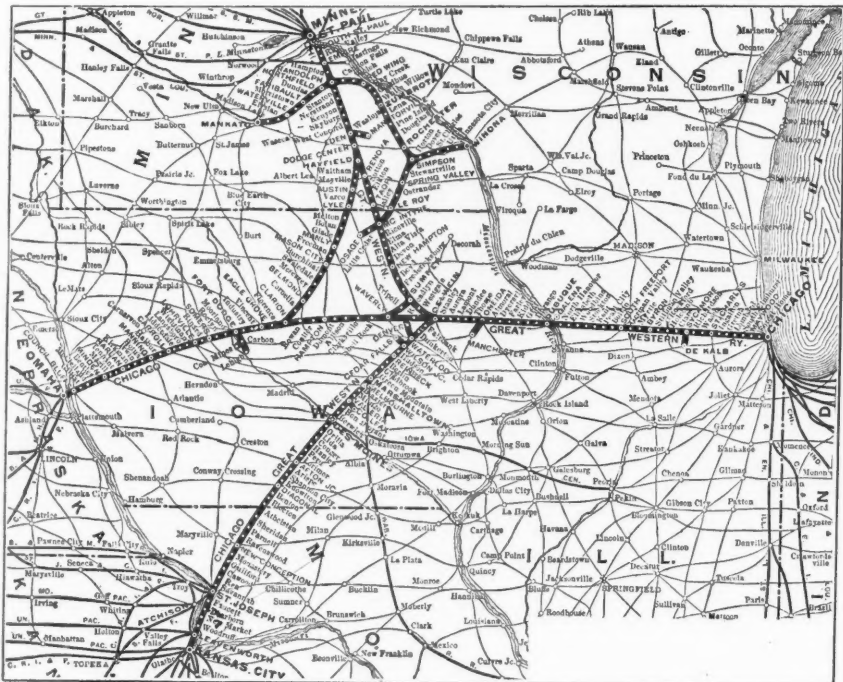
The bonds issued by these two companies make up the entire long term bonded indebtedness of the system. An issue of 4 per cent. debenture stock which has most of the attributes of bonds except the power of foreclosure takes the place of a first mortgage bond issue for the Chicago Great Western. It has, however, at present outstanding \$8,473,061 in short term notes maturing during the next five years, and \$272,271 in equipment lease warrants. The Mason City & Fort Dodge has \$12,000,000 50-year first mortgage bonds issued in 1905 outstanding, and the Wisconsin, Minnesota & Pacific, \$5,796,000 first mortgage bonds outstanding. It can therefore hardly be claimed with justice that the Chicago Great Western is a trunk line railroad without a mortgage, although it is true that, leaving its debenture stock out of consideration, it has, including its two subsidiaries, an exceedingly low bonded debt. The bonds issued on the subsidiary companies, however, about cover the cost of their construction. The principal change in capital liabilities of the parent company during the year was an increase of over \$13,000,000 in preferred B stock issued. This was in exchange for the similar amount of stocks of the subsidiary companies, and was handed over to the syndicates which were responsible for the construction of those roads.

From the standpoint of earnings the year was a very successful one. The three companies with a total mileage of 1,467 miles earned \$11,147,687 gross, an increase of \$1,628,576, and \$3,823,733 net, an increase of \$782,147 over the fiscal year ended June 30, 1905. On the Chicago Great Western proper gross earnings increased \$1,461 and net earnings \$612 a mile. From the \$2,539,493 income after operating expenses and taxes, there was paid besides the regular 4 per cent. interest payment amounting to \$1,044,978 on the debenture stock, a semi-annual dividend of 2½ per cent. on the preferred A stock, the first payment made on this security since February, 1904. Even after this extra payment of \$283,423 there remained income enough to appropriate \$686,724 to a fund for improvements and renewals, in marked contrast with 1905 when no such appropriation out of income was made. At the same time there was a profit and loss surplus for the year remaining of \$419,980, of which, however, \$283,000 must be allotted to the 2½ per cent. dividend payment on the A stock payable October 1, 1906.

Besides larger railroad earnings, which were, of course, the main cause of the successful income results of the year, there was an increase of \$124,000 in the amount received by the present company as the surplus earnings of the proprietary lines.

In the review of the annual report of this company in the *Railroad Gazette* last year, the maintenance figures were severely criticised as compared with amounts spent by other railroads in similar territory. There has been little improvement during the past year in this respect. Maintenance of way on the parent line, including, according to the company's statement, "renewals" (though it is difficult to tell where there is any room for renewals in last year's figures), cost \$894 a mile against \$890 in 1905 and about \$1,000 in 1904. On the Mason City & Fort Dodge the figure was \$372 against \$364 in 1905, and on the Wisconsin, Minnesota & Pacific \$415 against \$445 in 1905. This makes an average charge of \$669 a mile on the 1,476 miles of the whole system, which for a trunk line railroad with a large proportion of through traffic and freight density during the past year of 1,065,196 tons one mile per mile of road on the 818 miles directly operated is a very low figure.

All traffic and mileage statistics are for the Chicago Great Western proper, so that it is not possible to judge of the operating efficiency of the through and branch lines as a whole. On this 818 miles of line, all but 20 miles of which are main line, the revenue train load in 1906 was 295 tons, a decrease of one ton from the previous year. The average train load to each freight engine mile was 254 tons. The car mileage figures show somewhat better results than in 1905 but are hardly satisfactory, the average



Chicago Great Western.

number of empty freight cars per train mile having increased 5 per cent. along with a decrease of 2½ per cent. in the number of loaded cars per train mile. With an increase of 19 per cent. in the mileage of loaded freight cars east, the mileage of empty freight cars in the same direction increased 16 per cent. Westbound the mileage of empty freight cars increased 34 per cent. against an increase of 11 per cent. in the loaded freight car mileage.

Passenger train earnings for the year were \$2,254,366, or \$2,755 per mile against \$2,526 in 1905, an increase of 9 per cent. The average amount received from passengers shows an increase of 95 per cent., and the average distance each passenger was carried of 102 per cent., two unusual figures resulting from the taking off of motor trains in suburban service between St. Paul and South St. Paul. This feature also reduced the number of passengers carried 44 per cent., but at the same time there was an increase of 13 per cent. in the number of passenger miles.

One feature of the company's balance sheet which must be criticised is the item "Advances from earnings," which appears among the capital liabilities. This account, which amounted to over \$1,000,000, is also carried among current accounts as an asset, the two entries thus exactly balancing on the complete balance sheet. This simply means that the amount mentioned has been spent out of earnings and will eventually be capitalized, but it seems an unnecessary confusing of the balance sheet to carry such an item, especially as it grows larger year by year. The principal statistics

of operation for the Chicago Great Western proper are as follows:

	1906.	1905.
Mileage worked	818	818
Freight earnings	\$5,993,374	\$5,096,543
Passenger earnings	1,984,403	1,820,564
Surplus earnings*	227,431	103,686
Gross earnings	8,573,148	7,377,711
Maint. way and renewals	731,396	728,015
Maint. of equipment	982,709	904,554
Fuel for locomotives	1,011,798	795,075
Conducting transportation	2,631,516	2,276,677
Operating expenses	5,817,455	5,123,093
Net earnings	2,755,493	2,254,618

*Of proprietary lines.

Canadian Pacific.

The Canadian Pacific is far too big a corporation to be adequately covered in the space of a brief 30-page annual report. As a railroad, it has in addition to the 593 miles of the Duluth, South Shore & Atlantic and the 2,153 miles of the Minneapolis, St. Paul & Sault Ste. Marie, its two controlled companies in the United States, a grand total mileage of 10,139 miles, on 8,777 miles of which are based the traffic returns for the past year, and 924 miles of which, a good sized railroad in itself, are now under construction. More than this, the company operates its own parlor and sleeping cars, express and telegraph services, and a fleet of 54 ocean, lake and river steamers, of which 18 on the Pacific and 15 on the Atlantic Ocean, are ocean-going steamships. The operating results of these extensive and varied activities are presented to the stockholders very briefly. The statement of earnings and expenses, for example, for the year ended June 30, 1906, occupies 14 printed lines. Most of the space in the report is taken up with the balance sheet items, the operations of the land department and the mileage and extensions of and improvements to the company's railroad lines.

Even the brief information available makes it evident that the year has been a remarkable one for its large increases in earnings. Gross earnings, including earnings from sleeping cars, express, elevators, telegraph and miscellaneous, as well as profit from ocean steamships, were \$61,670,000, against \$50,482,000 in 1905, a gain in one year of \$11,188,000, or over 22 per cent. Even more remarkable is the fact that with this large increase in gross earnings operating expenses increased only \$3,690,000, or a little more than 10 per cent. Net earnings, therefore, show a gain of nearly \$7,500,000, being \$22,973,000, against \$15,475,000 in 1905. An idea may be gained of the rapid growth of the company by the fact that in 1896 total gross earnings were only \$20,682,000 so that there has been an increase of over 200 per cent. in ten years. Of the increase of over \$11,000,000 last year in gross earnings, passenger earnings furnished \$2,458,564, and freight earnings \$7,787,683. Earnings from sleeping cars, express, elevators, telegraph and miscellaneous, including profit from ocean steamships, were \$5,408,161, against \$4,469,643, an increase of nearly \$1,000,000 in this item.

Half of the increase of \$3,600,000 in operating expenses was in the item of conducting transportation, which was \$18,785,696, against \$16,905,849 in 1905. There were smaller increases in maintenance of way and structures, maintenance of equipment and parlor and sleeping car expenses, while there was a slight decrease in expenses of lake and river steamers. Maintenance of way works out at \$1,037 per mile of road, against \$995 in 1905, an average increase of \$42 per mile on each of the 8,777 miles operated. The operating ratio dropped from 69.35 in 1905 to 62.75 per cent., reflecting the small increase in operating expenses compared with the increase in gross earnings.

The year has seen an increase of \$16,900,000 in the stock outstanding, raising the total to \$101,400,000. There was also issued during the year \$12,000,000 4 per cent. consolidated debenture stock, part of which was used to pay a debt of \$7,000,000 due the province of Quebec in connection with purchase of the railroad between Ottawa and Quebec, the remainder being used for construction of branch lines and the two additional Atlantic steamships, the "Empress of Britain" and the "Empress of Ireland," which have been put in commission during the year. These two new steamships, it is worth mentioning, are among the finest in the transatlantic service, and have brought up the standard of the Canadian Pacific steamship line to that of the best of the American lines.

The land sales were 1,115,743 acres, which realized \$6,513,452, an average of \$5.84 an acre. The sum of \$6,500,000, received from land sales, was, in addition to earlier payments, deposited with the Dominion Government toward the redemption of the \$15,000,000 land bonds mortgage, leaving a balance due on account of this mortgage of \$1,500,000. Against this, deferred payments are due on account of land and town sites sold amounting to \$16,382,823. After the redemption of these land bonds the net receipts from land sales will be a clear profit to the road, an item of revenue which it is figured will, even at the average price now being received, amount, by the time the lands are exhausted, to about \$125 a share on the present outstanding stock, this calculation taking no consideration of probable increase in the price received for the land or the great increase in traffic which must result through settlement of the now unoccupied land.

The only unfavorable financial item of the year's results is the fact that the Duluth, South Shore & Atlantic, of whose 4 per cent. consolidated mortgage bonds the Canadian Pacific holds \$15,107,000, besides \$3,000,000 income certificates, failed to meet any portion of the year's interest. Although the 1906 earnings of this road show a good increase, the necessity of defraying out of revenue certain large and unusual expenditures, particularly the cost of a new ore dock at Marquette, left nothing for the bond interest. It is mentioned, however, that very much better results from this property are anticipated in the present year.

Perhaps the most striking feature of the report is the expansion of the railroad lines shown. As already mentioned, 924 miles are under construction. The following is a summary of the progress of this work. The Guelph & Goderich Railway, which is to run from Guelph, Ont., west to Goderich, on Lake Huron, 80 miles, is nearing completion. Work on the line between Toronto and Sudbury, Ont., 226 miles, is well advanced. This line runs from Bolton, the junction with an existing branch west from Toronto, north along the eastern shore of Georgian Bay to Sudbury. It is expected that the Wolseley branch, from Wolseley, Sask., to Reston, Man., 122 miles, will be finished this fall. Grading is being done in both directions between Wetaskiwin, Alb., Strassburg and Sheho, Sask., on a through connection between the Manitoba & North-Western line, the Pheasant Hills branch, and the city of Edmonton, this to be completed in the year 1907. This line will require an important bridge over the Saskatchewan river at Edmonton. In order to provide a new and more economical route between Montreal and Georgian Bay, a road is to be built from Peterboro, on the Ontario & Winnipeg line, to Victoria Harbor, 96 miles. This will shorten the distance from Montreal to Georgian Bay over the Canadian Pacific from 449 miles by the present Owen Sound route to 258 miles, with much more favorable grades. The new line is to be built by the Georgian Bay & Seaboard, which is to be leased to the Canadian Pacific at a rental equivalent to 4 per cent. interest on its bonds. Arrangements have also been made for a lease of the Joliet & Brandon (formerly the Montreal & Lake Maskinonge) which runs from St. Felix de Valois, Que., on the Joliet branch to Lake Maskinonge, as well as for a lease of the Walkerton & Lucknow, which runs from Proton, Ont., on the Toronto, Grey & Bruce line to Walkerton, 37 miles; also of the Berlin, Waterloo, Wellesley & Lake Huron, and of the roads built and to be built by that company in Ontario, including those bought by it from the Galt, Preston & Hespeler and the Preston & Berlin.

To pay for construction of the following branch lines, the stockholders will be asked to authorize the issue of 4 per cent. consolidated debenture stock: The Moose Jaw branch, northwesterly for about 50 miles, from Moose Jaw, Sask., the junction of the main line with the "Soo" connection to St. Paul; the Weyburn branch, from Weyburn, Sask., on the northwestern extension of the Souris branch to Stoughton on the Arcola-Regina extension of the Souris branch, about 36 miles; an extension of the Stonewall branch from Teulon, Man., northerly about 20 miles; an extension of the West Selkirk branch from Winnipeg Beach, Man., to Gimli, 10 miles; a branch from Lauder, Man., on the Souris branch, westerly to Broomhill, about 20 miles, and a six-mile branch from a point near Darlingford on the Manitoba South-Western Colonization Railway southerly. In addition to all this branch line construction, the company is actively engaged on the double tracking of the main line from Winnipeg east to Fort William on Lake Superior, 427 miles, an improvement which it will take at least two years more to finish.

The principal statistics of operation follow:

	1906.	1905.
Mileage worked	8,777	8,568
Freight earnings	\$39,512,973	\$31,725,290
Passenger earnings	16,041,616	13,583,052
Gross earnings	61,669,589	50,481,882
Maint. of way and struct.	9,165,250	8,527,135
Maint. of equipment	7,369,566	6,616,258
Conducting transportation	18,785,696	16,905,849
Operating expenses	38,696,446	35,066,794
Net earnings	22,973,313	15,475,088
Net income	16,012,216	8,875,686

Chicago, St. Paul, Minneapolis & Omaha.

This road, operating 1,698 miles of line, is an important part of the Chicago & North-Western system, since it includes that part of the lines about St. Paul and Minneapolis, with a connection through those cities from Duluth and Ashland on the north to Sioux City and Omaha on the south, besides various branches. It also makes up the northern half of the through line from Chicago to St. Paul and Minneapolis, and connects closely at some dozen other points with the Chicago & North-Western. In spite of its close relationship with the controlling company the road is only informally united with it under the title, adopted apparently mainly for the convenience of the traffic departments, The North-Western Line, but otherwise is still maintained as a distinct property and presents a separate annual report.

Attention was called in reviewing the report of the Chicago & North-Western in these columns two weeks ago (the map published at that time shows the C., St. P., M. & O. lines) to the low main-

tenance charges on that road. Maintenance expenses on the smaller road are still lower. For instance, maintenance of way, which cost a little over \$1,000 a mile last year on the C. & N.-W., cost only \$960 a mile on the C., St. P., M. & O. Repairs of equipment, against \$1,600 per locomotive, \$500 per passenger car and \$40 per freight car on the larger road, cost \$1,250 per locomotive, \$390 per passenger car and \$40 per freight car on the smaller, with \$40,649 spent for renewals, comparing with some \$3,750,000 for renewals on the North-Western proper. Of course, certain of the Omaha's lines are lines of light traffic and yet, with the important Twin City territory included in its mileage, it is surprising to find that maintenance is not more costly.

So far as earnings are concerned, the year has been a satisfactory one. Gross increased over \$1,000,000 and net more than \$380,000. Freight earnings brought \$615,000, and passenger earnings \$342,000 of the increase. The larger net earnings made it possible for \$600,000 instead of \$400,000 as in 1905, to be appropriated for future improvements, while even after the deduction of this extra \$200,000 the profit and loss surplus for the year was \$331,000—\$177,000 larger than in 1905.

Various improvements were made during the year, including a 10-mile extension from Winter, Wis., east to Draper, new second track, new yards, and four changes in the line. There are now under way further betterments of the same sort, including an extension from Hartington, Neb., northeast to Crofton, 15 miles, and new second track at Duluth and third and fourth track and a new yard at St. Paul.

The following table summarizes the principal results of the year's operation:

	1906.	1905.
Mileage worked	1,693	1,686
Passenger earnings	\$3,422,426	\$3,080,575
Freight earnings	8,753,166	8,138,065
Gross earnings	12,943,750	11,926,000
Maint. way and structures	1,625,043	1,381,588
Maint. of equipment	1,209,831	1,153,178
Conducting transportation	4,587,629	4,317,070
Operating expenses	8,310,945	7,676,528
Net earnings	4,632,806	4,249,472
Net income	3,018,140	2,641,129

NEW PUBLICATIONS.

Railroad Accidents, Their Cause and Prevention. By R. C. Richards. 4½ x 7 in.; 111 pages. Chicago: Published by the Association of Railway Claim Agents, C. L. Young, Secretary, 215 Jackson Boulevard. Price, \$1.

This is an exceedingly spicy and readable book on railroad accidents of all kinds, prepared by a veteran claim agent who addresses himself directly to the train men, station men and others who are responsible for most of the accidents on railroads; and he speaks in language of such refreshing simplicity and directness that the lowest track man or freight house laborer though a fool need not err therein. Every preachment is backed up by a paragraph giving the detailed facts, with names and dates, of an actual case. The headings of the chapters include: Injuries to passengers; ejection of passengers and others from trains; accidents to travelers on the highway; trespassers; locking of turntables; damage by fire to adjacent property; injuries to employees caused by the carelessness of other employees; accidents caused by defective equipment, defective scaffolds, etc.; defective floors and platforms; obstructions; carelessness of engineers, and several other topics. Readers of the *Railroad Gazette* who may examine this book will at once recall the fact that a good deal of it has been printed in these columns during the past year, and most of those interested will be able to guess the name of the road with which the author of the book is connected; in short, will be able to satisfactorily localize this very instructive and entertaining information which Mr. Richards has given to the railroad world. All of the matter has, we believe, been brought to the attention of the employees of the road on which the accidents cited in the book occurred; and, unlike many things that are written for the instruction of railroad employees, it has been put in such shape as to be useful and instructive to men on other roads. The injunctions to obey the rules and to exercise good judgment, and thereby prevent accidents, are in some cases too much like the heartless paragraphs of the rules themselves, assuming apparently that compliance is easy, under circumstances which every practical man knows to be hard. The author's tone and spirit are, however, so uniformly fair and considerate that no careful reader will accuse him of requiring impossibilities.

CONTRIBUTIONS

Early Wooden Railways.

New York, Sept. 12, 1906.

To the Editor of the Railroad Gazette:

Speaking of early railways, I send you a little history from my personal knowledge.

In 1839 I lived in the village of Dexter, Jefferson County, New

York, on the Black River, where there was abundant water power and a sawmill, large for those days. It had been the custom for several years to carry sawn boards from the mill by arm, shoulder and back some considerable distance and stack them on the banks of the river below the dam. This was a laborious job, and it occurred to the boss to construct a wooden railway, which was done by grading the ground, laying crossties (similar to those now in use on railways), placing a 6 x 6 scantling lengthwise over the crossties, and on the top of the scantling a wooden strip, 2 x 3, which served as the track. A wooden platform car about eight by twelve feet was constructed and placed on the track, and for many years that system of taking lumber from the mill was used.

I cannot remember by just what means the car was kept from running off the track; but the experiment was successful and was considered to be a wonderful achievement at the time. The railway had a considerable down grade, and the main labor of transporting the lumber was in holding back the car, which was done by hand. When the car was unloaded it was easy work to push it back to the mill for another load.

W. B. LASSCELL.

Western Interpretations of the Law.

J. C. Stubbs, of the Union and Southern Pacific, and chairman of a committee appointed two months ago by the railroads west of Chicago, to study doubtful points in the new rate law, has made a report answering thirty questions propounded by various companies, concerning passenger transportation. The more important answers are in substance as follows:

There is no authority in law for making lower rates to land-seekers and settlers than for other travelers.

The law committee advises that transportation cannot be issued in payment for advertising. It is generally accepted, however, that carriers may carry an open account with publishers and that publishers may carry an open account with carriers for advertising and that these accounts can be balanced periodically. The balance, whatever it may be, must be paid in cash. The transaction must be devoid of previous agreement that the services done by either party for the other is to be paid for in any other way than by cash.

Special reduced rates may be made for Federal and State troops and for officers and employees of the United States geological survey and for reclamation service in the future as in the past.

The words of the law excepting "inmates of hospitals and charitable and eleemosynary institutions and persons engaged in charitable and missionary work," from the free pass prohibition are held not to apply to doctors, nurses and other employees.

Nuns, sisters of charity, missionaries, evangelists, national or State officers of religious organizations, teachers and pupils in Indian schools, officers of the Salvation Army and Volunteers of America, it is held, may be given free transportation.

Special rates for theatrical companies, baseball clubs, etc., are held to be discriminatory.

Special rates for army and navy officers and their families, which always have been made in the past, are held unlawful.

Regarding the interchange of transportation by common carriers for the use of officers and employees and their families, the committee decides such interchange may be made with sleeping car, express and steamship companies, but not with telegraph and telephone companies.

New Tramways in London.

The London County Council proposes some 32½ miles of new lines for next session, nine miles of which it is proposed to electrify on the overhead trolley system, the remainder on the conduit system. The total estimated cost of the new lines is three-quarters of a million pounds. Perhaps the most interesting proposal is that for getting over the difficulty in Tottenham Court Road. It will be remembered that the Council last year sought to extend the line which at present terminates at the junction of Hampstead and Tottenham Court Roads, down Tottenham Court Road, but that proposal was rejected by Parliament, who considered the lower end of Tottenham Court Road too narrow for a double line. It is now proposed to lay a double line along Tottenham Court Road as far as Francis street, and here to divert one of the lines along Francis street and Gower street to New Oxford street. The Council also proposes to revive the Marble Arch to Cricklewood line which was rejected this year, the only alteration being the proposal to construct a loop line at the Marble Arch, so as to avoid a dead end terminus in Edgware Road. A reduction in the number of these latter, the multitude of which forms an eminently unsatisfactory feature of the present system, is to be welcomed, as is also the proposal of the Council in many cases to avoid expensive street widenings by laying alternative single lines in different streets.

The History and Organization of Italian Railroads.

BY EDWARD P. NORTH.

Railroad building in Italy was inaugurated in the Two Sicilies in 1839 by the construction of five miles between Naples and Portici. This was followed by roads in Lombardy and Venezia, Tuscany, Piedmont, Parma and Modena, and lastly the States of the Church. The first road connecting Rome with the seacoast at Civita Vecchia was finished in 1859. In 1861 Rome was connected with Naples, and in 1866 with both Ancona in the Adriatic and through Florence with the railroads in Northern Italy. In 1866 by the building of some 30 miles between Messina and Syracuse, railroad building on the island of Sicily was begun. In Piedmont, Parma and Modena, and Tuscany, the roads were built by the governments of those countries, and as these countries were consolidated in a united Italy the ownership of the railroads was assumed by the general government. In Lombardy and Venezia the roads were built and owned by an Austrian corporation; in the States of the Church by a company called "Romana," formed in 1862 and backed by French cap-

ital. From Bologna to Brindisi the roads were owned by a private company called "Meridional." All the roads in the Two Sicilies were owned by private companies.

the division of the profits between the company and the government. The Italian government assumed control of these roads partly in consequence of the general unpopularity of the companies' management and partly because of friction which had arisen in regard to the making of renewals and improvements. Nearly all station grounds are inadequate in area and accommodations, so that though radical reductions in passenger rates have been made no reductions in freight rates are at present contemplated, as the stations cannot handle with economy the freight now presented. As a sample of the spirit governing the renewals of rolling stock, two Rogers locomotives, with inclined cylinders, bought in 1862, are still in use at Genoa.

After 1875 many branch lines were authorized by the government. These are built and worked by private companies which receive a yearly subsidy of from \$960 to \$2,400 a mile for 70 years, after which, with lines and equipment, become the property of the government. These secondary roads yielded in 1902 \$4,400,000 in gross earnings.

Italian railroads are under the authority of the Minister of

Public Works. The organization consists of a Director General, who is Chairman of the Managing Board, which has six other members. They are specialists respectively in traffic management, construction, maintenance, harbor and hydraulic work connected with railroads, tariffs and promotion of traffic, and one appointed by the Minister of the Treasury to advise on financial matters. The board as executive officers have under them 13 chiefs of departments, who are charged with correspondence, accounts, legal affairs, sanitary interests, personal interests, purchasing, traffic management, time-tables, maintenance of road and buildings, working the rolling stock, repairs of rolling stock, new construction and actuarial matters. All of these have their offices in Rome. The entire railroad system has been divided into eight sections, with from 1,600 to 3,200 miles of line in each. The amount of traffic and number of employees is, however, approximately equal in each section, ranging from 11,000 to 12,000 employees, and yearly traffic receipts of from \$8,000,000 to \$8,100,000 yearly earnings. The head offices of these sections are at Turin, Milan, Venice, Genoa, Florence, Rome, Naples and Palermo. Two of the sections are divided into sub-sections, i.e., in Milan for railroads worked by electricity, and in Messina for the ferry service which connects Sicily with the rest of Italy. The heads of these sections have considerable independence in matters of discipline, the arrangement of local trains, maintenance of way and rolling stock and liquidation of claims, but they have only an advisory voice in the matter of tariffs, through time-tables and purchases of general supplies. They can neither initiate new work nor make large improvements without the sanction of the Managing Board. In each of these sections there is a chief with an advisory board of four persons chosen from local patrons of the road, who, however, are not in its employ. The chief has as assistants the following officers: Secretary, accountant, lawyer, sanitary officer, traffic manager, superintendent of rolling stock and superintendent maintenance of line and buildings. These chiefs have generally a daily telephonic conference with the Director-General, and once a month they come to Rome for one or two days for a general conference with the Director-General and with each other. This is obligatory. In addition, old employees who, though not equal to continuous service, have valuable knowledge in their specialties from a consulting and inspecting board, reporting only to the Director-General.

The total income of the Italian railroads was for the year 1902 a little over \$67,000,000, of which about \$26,000,000 came from passengers and about \$41,000,000 from freight, including baggage and dogs. Freight is classified as *grand velocity*, which comprises all baggage except hand baggage, newspapers and dogs going by passenger trains (there is no free baggage in Italy), and yields slightly over 1 per cent. of the total freight receipts; *small velocity accelerated* corresponding with our express freights, and yielding about 0.8 per cent. of the total, and *small velocity* which comprises ordinary freight and cattle—the bulk of the freight business.

There are four regular classes for passenger travel. Nearly twice as many passengers are carried at special rates varying from



Sketch Map of Italian Railroads.

ital. From Bologna to Brindisi the roads were owned by a private company called "Meridional." All the roads in the Two Sicilies were owned by private companies.

In 1875 the government bought up and began to operate all the roads owned by companies, except those owned by the companies "Romana" and "Meridional." In 1882 the government bought also the roads of the "Romana" company. In 1885 the government roads were divided into through systems, or "nets," the Mediterranean, Adriatic and Sicilian, the "Meridional" roads being incorporated in the Adriatic net. Contracts were then made for 20 years with three companies to operate the three nets. The companies operating the Mediterranean and Adriatic systems were allowed to retain 62½ per cent. of the profits, while the Sicilian company, on account of the poverty of the country and the heavy grades of the railroads, was allowed to retain 84 per cent. At the end of 20 years the contracts might either be renewed or the roads and their equipment be taken over without compensation by the government. In July of the present year the government assumed control of the entire Mediterranean and Sicilian nets and all of the Adriatic net not the property of the Meridional company; the last mentioned company retaining its government guarantee of 5 per cent. on the cost of its lines up to a limit of \$6,400 a mile, after which there is a rule for

1½ fares per round trip to military tickets with a discount of 78½ per cent. There has recently been a considerable reduction in passenger rates in the hope that the reduction will lead to more long distance travel and a greater intimacy between the people of north and south Italy.

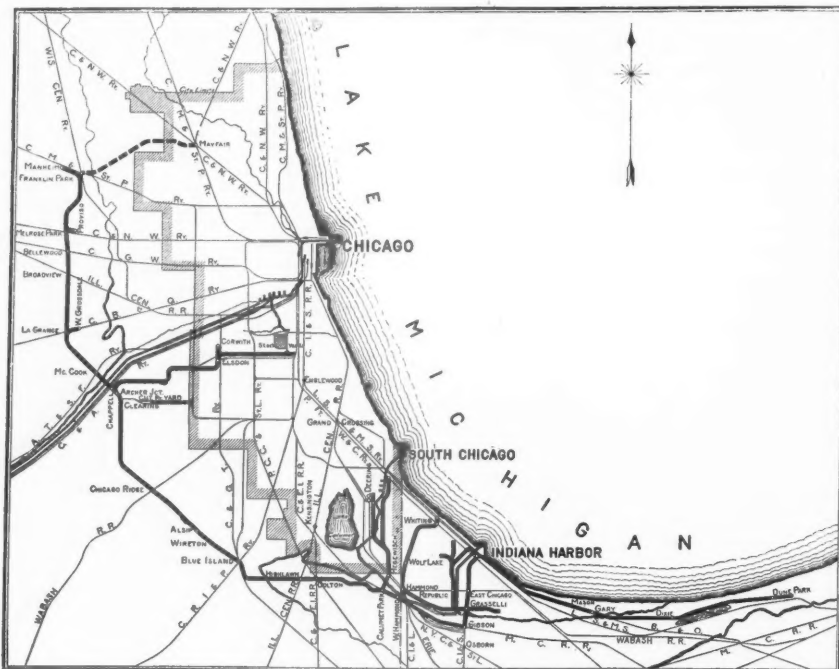
Large contracts for new rolling stock, rails, etc., have recently been placed, and larger ones will soon be imperative, as the property taken over by the government is much deteriorated. To all suggestions that America presents a fine field for purchases a disposition to have the contracts given to Italian firms is exhibited, but as there has been a limited demand on Italian factories in the

repair state roads, and next year at least \$80,000 will be wanted. The commission holds that a 30-h.p. machine will damage a road three times as much as a 10-h.p. machine, and it is proposed that the taxes shall be on this basis.

The Gibson Yard of the Chicago, Indiana & Southern and Indiana Harbor.

An official map of the new Chicago, Indiana & Southern Railroad, the New York Central line formed last spring by consolidating the Indiana, Illinois & Iowa and the part of the Indiana Harbor Railroad from Chicago through Indiana Harbor, Ind., to Danville, Ill., was published in our issue of June 1, together with some comment regarding the advantages and traffic possibilities of the new road. The name Indiana Harbor Railroad is retained by the Indiana Harbor Belt, operating the Chicago outer belt, extending from Indiana Harbor, Ind., to Franklin Park, Ill., as shown by the accompanying map. Lines to the Union Stock Yards and to Dune Park, Ind., are included, the total mileage operated being 86 miles. This line does a general freight interchange business with all of the lines entering Chicago and serves a great many industries. Following the establishment of the new system, one of the first considerations was the provision of suitable yard facilities for proper handling of the considerable traffic originating in the Indiana Harbor, East Chicago, etc., industrial districts, and from the south over the C. I. & S., destined for the lines west and north from Chicago, and vice versa.

Referring to the map it will be noted that the Chicago, Indiana & Southern joins the belt system at Gibson, Ind., the crossing with the Michigan Central. This vicinity, therefore, was the logical place for the location of the yard. The site selected is immediately south of and parallel to the Michigan Central, the western end of the yard lying close to the eastern outskirts of Hammond and the eastern end being adjacent to the main line of the Chicago, Indiana & Southern, as shown by the accompanying plan of the yard. The yard has two parallel independent connecting tracks to the Michigan Central at the west end, and a north and a south connection to the Chicago, Indiana & Southern tracks at the eastern end. The yard is about two miles long, has capacity for 2,600 cars exclusive of the future additions indicated, and consists of practically duplicate halves for east and westbound business respectively. Its location is only about four miles from Lake Michigan and the country is low-lying and sandy. Sand was used entirely for filling and grading, some 550,000 cu. yds. being required for the 40 miles of track in the yards.

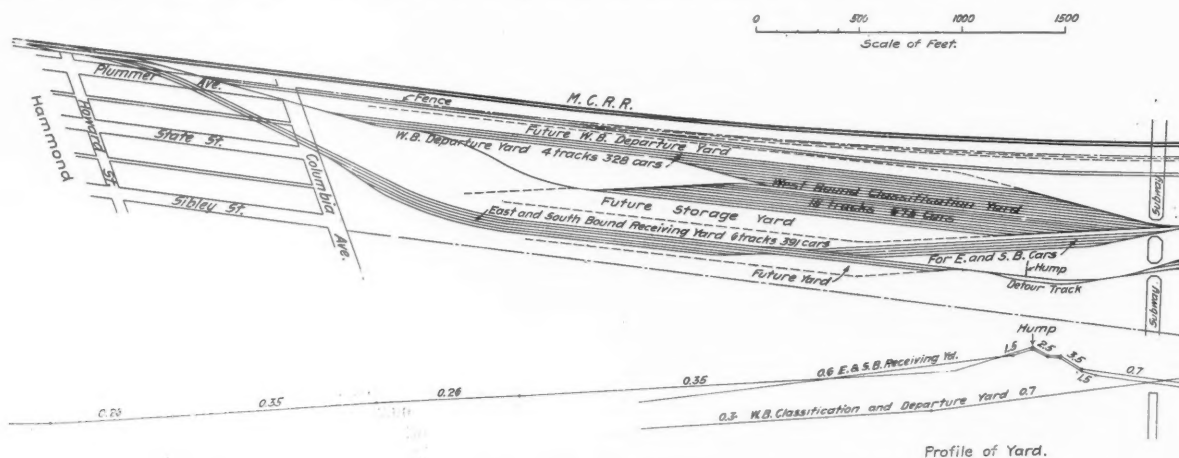


Map of the Indiana Harbor Railroad.

past for such material, they are unprepared for the emergency, and it will be necessary to go into foreign markets to meet the necessities of the case.

Wear of Roads by Automobiles.

The Massachusetts State Highway Commission finds that motor vehicles are causing rapid deterioration of macadam roads, and that something will have to be done to provide for the great resulting expense. The weight of these vehicles and the rapid speed at which they are operated make them far more injurious to roads than



Proposed Yard for the Indiana Harbor Railroad near Hammond, Ind. (1)

wagons. Over half of the 13,000 automobiles registered in Massachusetts are above 20 h.p. The commission recommends the revision of the taxation laws, so that automobiles shall be taxed, because of the damage they are doing to the state highways. They are claimed to be doing damage amounting to \$50,000 a year. The commission has been obliged to ask for an appropriation of \$70,000 this year to

As the plan shows, it is a gravity yard, and two features are particularly worth noting. One of these is the relation of the receiving yards to the humps, best seen in the profile, and the other the "re-humping" feature, to be explained in order. With reference to the first, taking a westbound movement it will be observed from the plan and profile that the summit of the hump is

only about 600 ft. from the extreme west end of the receiving yard tracks; also that the receiving yard is on a 0.25 per cent. grade toward the hump, which increases to 0.6 per cent. in the hump approach track. This arrangement is due partly to the conditions controlling the layout of the yard, but its advantage from the operating standpoint was of primary importance in determining its adoption, since it will minimize the pusher engine service by enabling each pusher engine to handle singly the maximum train brought into the receiving yard by the road engine; that is, by raising the level of the receiving yard to such a point as to make the approach grades to the summit of the hump comparatively easy, and the intervening distance being short, the operating expense is minimized and a greater rapidity of car movement secured. The plan involves some additional first cost in the greater quantity of filling required to raise the level of the yard, but this is quickly absorbed in the decreased cost of engine service, which is a continuous expense.

A westward movement through the yard would be as follows: The road engine having drawn its train into the receiving yard—which is composed of three shorter tracks of 115 cars capacity and three longer ones of 245 cars capacity—upon cutting off from the train, will be able ordinarily to back down the north longer track, which will be kept open when possible, to the roundhouse; or it may use the engine detour track to cross over to the main yard tracks. The train is then taken by the pusher engine for breaking up over the hump into the classification yard. Any cars having an eastward or southward destination, however, are diverted onto the tracks so marked, lying south of the westbound classification yard. From here they are drawn into the east-and-southbound receiving yard and "re-humped" over the eastward summit into the east-and-southbound classification yard. Road engines from the east-and-southbound receiving yard can either pass over the hump to run to the roundhouse, or back down the central track of the receiving yard to the main yard tracks.

This is to be the principal terminal of the Chicago, Indiana & Southern and the Indiana Harbor and suitable facilities to care for the engines are provided at the east end. These include a 25-stall roundhouse, which can be enlarged to the full circle when necessary, a small shop, power station, storehouse, coaling station and ash pits. These facilities are strictly modern in every respect. The buildings are brick and concrete construction. The shop is to be electrically driven by alternating current motors and will contain a hoist for unwheeling locomotives, also motor driven. It will be served by a Nichols transfer table with a. c. motor, and has capacity for eight locomotives. There is space on the opposite side of the transfer table for another shop building, when needed. The power station will contain two 500 h.p. boilers, two 160 h.p. Erie engines driving two Crocker-Wheeler 100 k.w., two-phase, 240-volt, 60-cycle generators, and a set of Westinghouse a. c. series arc light apparatus. The engine house will contain a heating, washout and blow-off system. The coaling station is of the elevating storage type and has pocket capacity for 400 tons. In principle it is quite similar to the Holmen design described in the *Railroad Gazette* July 14, 1905, the coal being dumped through a track hopper into a bucket which is hoisted and automatically dumped into the overhead storage pocket. There are two buckets, one descending as the other ascends.

In addition to the locomotive terminal and repair facilities there will be a bad order car repair yard having capacity to store

cross it in each case on two 21-ft. reinforced concrete arches having about 13½ ft. headroom. The yard will be lighted by a. c. arc lights, along the sides instead of down the centers. There will be about 25 of these lights. The yardmaster's office, which will be centrally located, will have a tower from which the operation of the entire yard can be watched. Four engines, working double-shift, will do the yard work. All tracks for principal movements are being laid with 80-lb. rail and the body tracks with 67-lb. rail. The work is about 75 per cent. completed, and it is expected to have the yard in operation by the first of December. The work is being done by company forces, except the buildings and coaling station.

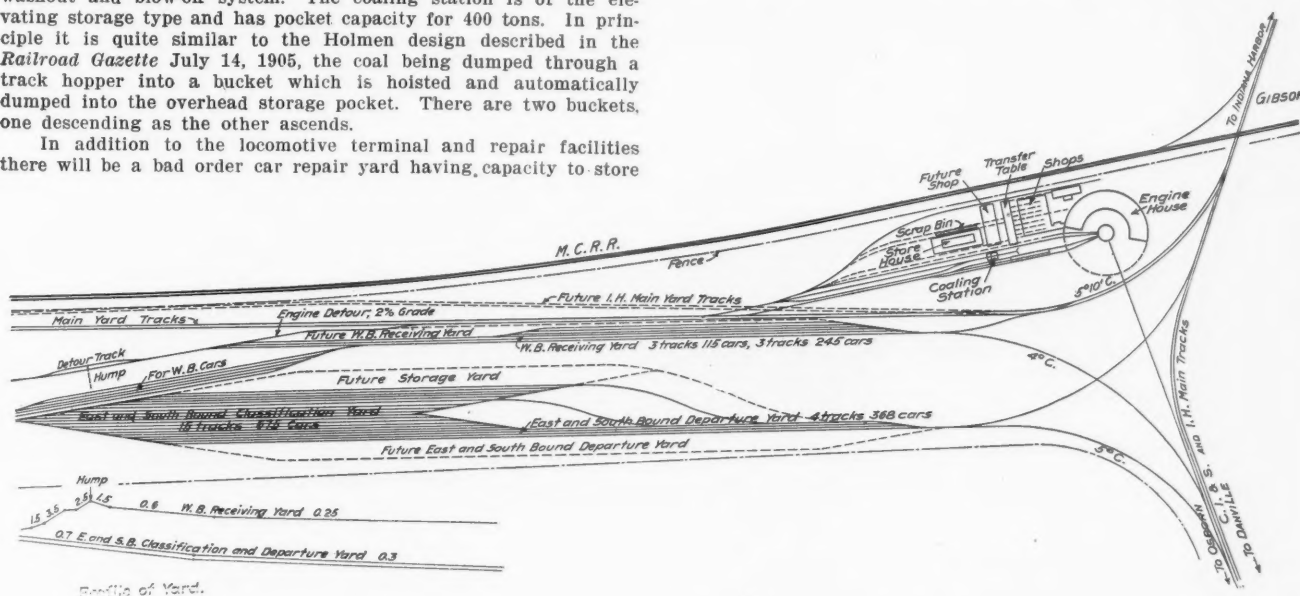
Mexican Railroads and Railroad Traffic.

BY SAMUEL H. BARKER.

Practical lessons in government regulation of railroad rates, a problem now new in the United States and one which is uppermost in the minds of all railroad managers, can be drawn from Mexico. In that country it has been fully demonstrated by the test of actual experience that the system, carried much further than it is by the new Interstate Commerce law, works without serious consequence, and to the general good.

There is a general railroad law in Mexico, but at the same time every railroad company exists under a special concession from the national government. This provides for undertakings on both sides. The government agrees to do certain things advantageous to the railroad, and it in turn is bound to other things. Virtually every railroad in Mexico is limited by its concession to maximum rates for the transportation of freight. This limitation is co-extensive with the life of the concession, which is usually 99 years. What the maximum rates shall be is agreed in advance between the government and the organizers of the company seeking rights. These maximum rates are not the same in all cases, differing and being determined largely by the character, resources and development of the territory through which the line is to run. But every Mexican road is restricted to the same maximum rates for passenger transportation. Following the system prevalent among everywhere except in the United States, Mexican railroads carry passengers in different classes. Maximum fares are 3 cents (silver) for first class, 2 cents for second class and 1½ cent for third class per kilometer.

Applying these rates to miles and reducing them to gold for easier comparison, the maximum passenger charges which Mexican railroads may make are approximately 2.4 cents per mile first class, 1.6 cents second class and 1.2 cents third class. Compared with passenger rates in the United States the average charge is thus low. Last year, for illustration, the average revenue of the National



Proposed Yard for the Indiana Harbor Railroad near Hammond, Ind. (2)

200 and repair 100 bad order cars at one time. This will not only be the principal repair point for bad order cars for this system but will also be used for other of the New York Central Lines, affording some relief to their present Chicago facilities.

The yard plan shows a subway midway between the eastbound and westbound yards. This is for a highway and the tracks will

Railroad Company of Mexico per passenger was 1.849 cents, Mexican, per kilometer, or a trifle less than 1½ cents of our money per mile. This compares with an average of 2.006 cents per passenger per mile for the railroads of the United States as shown by statistics for the fiscal year ended June 30, 1904. Taking large sections of the United States, as grouped by the Interstate Com-

merce Commission, where travel is more nearly equal in density to that in Mexico, the average revenue figures around 2½ cents per passenger per mile, going as high as 2.371 cents in the Virginias and Carolinas group. The practice of Mexican railroads is to charge up to the legal limit on all passenger business except that handled on through tickets issued in connection with railroads in the United States. But it must be remembered that the very large proportion of passengers carried third and second class materially reduce the average passenger mile revenue of Mexican lines.

Accommodations afforded all classes of passengers are the same in train service, differing only in the equipment provided. Third class passengers are herded into cars with interior finish about as in our baggage cars. Along each side of the car, extending its entire length, are plain wooden benches. Through the center, placed transversely, are other wooden seats, with an aisle on each side. Second class cars are plainly finished and have comfortable wooden seats arranged on each side of a central aisle as in our cars. First class cars are just like the passenger coaches in the United States. Frequently one car is divided by a partition in the middle into first and second class. Only passengers holding first class tickets can ride in Pullman cars.

Freight rates in Mexico average higher than in the United States, as would be expected. For example, the average revenue of the National Railroad Company of Mexico last year was 1.885 cents (silver) per ton per kilometer—more than was the average revenue per passenger per kilometer. Reducing to American money and applying to the mileage basis for comparison, it will be seen that the Mexican line collected slightly over 1½ cents per ton per mile. This is about double the average freight revenue per ton per mile for all railroads in the United States, and one-half higher than the average rate in the less thickly settled parts of this country where traffic is least dense and rates average high.

Extending the comparison further and again taking the National Railroad Company of Mexico as an illustration the following appears: Last year the gross earnings of this company per train mile were \$1.7642, and its operating expenses \$1.1458, gold. For the fiscal year ended June, 1904, the United States railroads earned an average of \$1.9396 gross per train mile, and the operating expenses were \$1.3137. Thus the Mexican line had net earnings of 61.84 cents per train mile; a sum not materially different from the 62.59 cents shown as the average for the roads in the United States.

Density of freight traffic, taking the United States as a whole, is far greater in this country, averaging 829,476 ton miles per mile of line. The Mexican road carried 303,899 tons. Density of passenger traffic approaches more nearly. In this country the average was 104,198 passengers carried one mile per mile of line. The Mexican National carried 80,804 passengers per mile of line. Here the average distance traveled by each passenger was 30.64 miles, and the average number of passengers per train was 46. The Mexican line last year carried an average of 53.4 passengers per train an average distance of 49.91 miles. In the United States the average haul per ton of freight on all lines was 244.30 miles, and the average trainload 307.76 tons, while the Mexican line's haul was 164.04 miles and the average trainload 239.56 tons on the standard gage system.

Government regulation of freight rates in Mexico is virtually complete. It is done through a railroad commission consisting of a president and six members, all of them men with private occupations. This commission meets one day each week in the City of Mexico to receive and go over with traffic officers of the railroads any proposals for changes in rates. No freight rate can go into effect except it shall first receive the approval and sanction of the railroad commission. Absolute power rests with this body to decide whether any proposed rate or change of rate is just and reasonable. Thus its powers are essentially initiating, and larger and more direct than those of the Interstate Commerce Commission under the Hepburn law. The fact that a rate once in effect can be changed only by convincing the commission of the advisability from the standpoints of shippers, the public and the government, as well as of the railroad, makes traffic officers exceptionally careful in determining what rates should be made. Yet, as a general thing, American railroad managers are not deterred from making rates which are in a sense experimental and designed to create or move some special traffic because such rates, if found too low in practice, are not easily changed. There have been instances when the commission has rejected proposed rates on the ground that they would be too low, just as there have been cases where the commission has refused to sanction rates which it thought to be too high.

Perhaps the fact that the government of Mexico is the largest stockholder in the National Railroad Company of Mexico, and as such is directly interested in the earnings of the property, even although no dividends are paid, exerts a subconscious influence with the Mexican Railroad Commission, such as would not exist with our Interstate Commerce Commission, to safeguard the interests

of the railroad. But while the government thus exercises a supervision almost paternal over the railroads and their acts, the nation is liberal in its policy of fostering railroad development. There are now slightly more than 10,500 miles of railroad in Mexico. With the national area of 767,060 square miles, equal to one-fourth that of the United States, and a population of about 15,000,000 people, this railroad mileage is small in comparison with that of this country.

But railroad development in Mexico is an enterprise of comparatively recent time, and railroad construction is now progressing fast—at the rate of several hundred miles a year. The Mexican Railway Company was chartered in 1864, and most of the railroad building across the border has been done in the last 20 years.

There are now two large railroad systems. In importance, in mileage operated, in traffic and in earnings they rank close together. The Mexican Central Railway has 3,390 miles of line. The National Lines 3,351 miles. Besides these two chief systems, which together comprise two-thirds of the entire railroad mileage, there are only a few companies which have more than 200 miles of line. The most important of these are the Mexican Railway, the old line from Vera Cruz to the City of Mexico, with 321 miles; the Vera Cruz & Pacific Railway, with 265 miles; the Mexican Southern Railway, with 258 miles, and the Tehuantepec National Railway, with 211 miles.

Government assistance has taken direct form, usually in concessions carrying stated subsidies. Thus the Mexican Railway Company, Ltd., was given a subsidy of \$560,000 per annum, the government further agreeing not to subsidize any other railroad between the City of Mexico and Vera Cruz. The original concession to the Mexican Central Railway Company, Ltd., carried a subsidy of \$15,200 per mile. In 1890 the government paid a lump sum of nearly \$15,000,000 for release from all further subsidy claims of the company.

Between the Mexican government and the National Railroad Company of Mexico a closer relationship exists. Since 1903 the government has owned \$29,972,700 of the \$63,553,600 stock of the company. This, of course, gives the government virtual control of the property, although the power to change the management has not been exercised in any way. The government stock was acquired under a plan proposed and carried out by Speyer & Co., of New York. When the Mexican government took this big share, it turned over to the company controlling securities of the Inter-oceanic Railway of Mexico, and gave the National exclusive rights to construct lines in its territory. The Mexican International is controlled and included in the system operated as the National Lines.

The original National Railroad was built under a concession giving it about \$4,300 per mile. All told, about \$6,000,000 was paid in subsidies up to 1895, when a full settlement was made with the old company. No subsidy was given the International, but its concession exempted it from taxation and payment of duties on materials imported. The Matamoras extension from Monterey to the mouth of the Rio Grande, 205 miles, which was opened last year, cost \$3,202,906, and the government subvention was \$2,000,000, of which \$1,800,000 has been paid, the balance being retained until the line is permanently ballasted and temporary light rails are replaced with heavier ones.

Pooling is legal in Mexico. Rebates, midnight tariffs, rate cutting and other such devices have never risen to special prominence in the situation. Commodity rates move much of the freight tonnage. Low rates have been made on ores and other freight carried to the smelters, these forming an industry, which, like that of iron and steel in our country, is a valuable one to the railroads for its large indirect as well as direct business. Mineral products, particularly ores, coal and coke, comprise a very large part of the traffic of Mexican railroads. Agricultural products rank next in importance, and then general merchandise and lumber. Traffic to and from the United States is large.

Standard Mexican railroads are well maintained and operated. Over the greater part of the 802 miles of railroad between the national border and the City of Mexico a speed of 55 miles per hour can be made without danger or discomfort to passengers. Beginning November 20, a solid Pullman train is to be put in service, running twice a week, between St. Louis and the City of Mexico. This train is to make the trip of 1,877 miles in 59 hours, or at an average speed for the entire distance of 32 miles per hour, including stops. In Mexico it will be operated over the National Lines and on this side of the border over the International & Great Northern, via San Antonio, and the Iron Mountain, via Little Rock.

Compared with the United States, labor is cheap on Mexican railroads, but fuel, cross ties, rails and other supplies are dear. Track laborers, nearly all peons, or Indians, get from 50 to 75 cents, Mexican, per day. The wages are highest in the north, where most influenced by United States labor, and become less in the center of the country. These wages, equivalent to 25 to 37½ cents per day in gold, cover a work day from sunrise to sunset. There are no labor unions, and such a thing as an eight hour day is unknown to the peon. Generally speaking, he works fast and

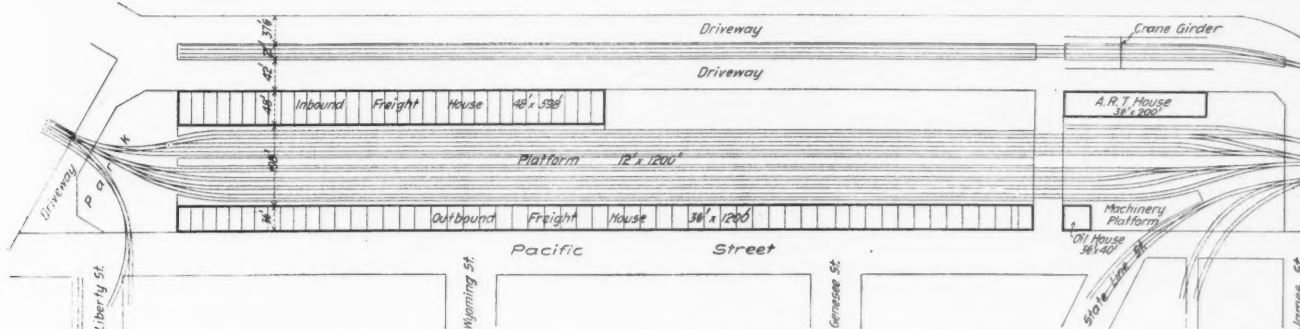
continuously, using his bare hands for much rough work. Cross ties cost about \$1.20 (silver) for Mexican oak and \$1.60 for American creosoted pine. Locomotive fuel, much of the coal being imported and coming from the United States largely by rail and from Great Britain by sea, constitutes a heavy charge in operating expenses, often exceeding 25 per cent. of the total cost of operation. The Mexican Central has some oil lands and is using oil as locomotive fuel to some extent.

The New Kansas City Freight Houses of the Missouri Pacific.

The Missouri Pacific for some time has been engaged in enlarging and rearranging its terminal facilities at Kansas City, Mo., on a scale adequate not only for present requirements but that

yards new inbound and outbound freight houses of substantial character and good appearance, drawings of which are shown herewith.

As seen from the general plan, the outbound house is 36 ft. wide and 1,200 ft. long, and the inbound house 48 ft. x 600 ft. A space of 96 ft. intervenes between the platforms of the two houses, midway of which is an island platform 12 ft. wide and 1,200 ft. long, covered by an umbrella shed. There are four tracks between platform and outbound house, and three tracks in the space next the inbound house. The design and construction of the two houses is similar, each having concrete foundation and superstructure of brick and steel, with terra cotta trimmings. The front end of each building is two stories high for a length of 200 ft. These portions will have tile roof covering, and the remainder tar and gravel. Each house has an elevated platform on the track side 6 ft. wide, protected by a canopy 7 ft. wide. On the team side of each the



General Location of Missouri Pacific Freight Houses at Kansas City.

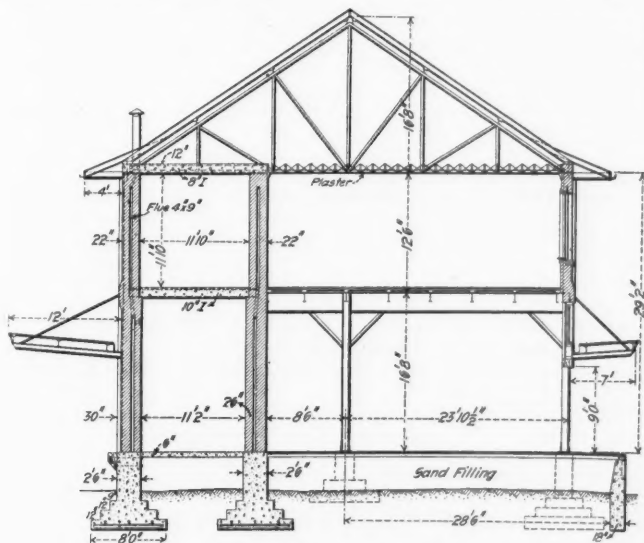


Elevation of Kansas City Freight House, Missouri Pacific.

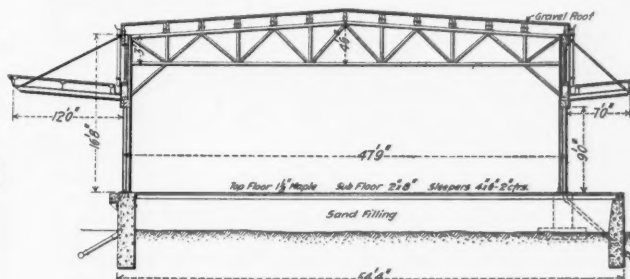
will provide for traffic needs for some time to come. A plan and detailed description of the large new freight yard in East Bottoms, in the northeastern part of the city, was given in these columns May 11, 1906. The principal freight houses are located at State Line yards in West Bottoms, adjacent to the local freight

canopy is 12 ft. wide. The character of construction is well shown by the typical elevations and sections exhibited herewith. In the office portion of the outbound house will be located the superintendent, division engineer, roadmaster, yardmaster and the telegraph offices. The local freight offices will be located in the second story of the inbound house, with lockers and rest rooms; also the local telephone exchange of the Missouri Pacific. The outbound house will contain 22 sets of scales and the inbound house seven. There will be coaling and oil rooms, and the buildings will be heated by steam and lighted by electricity.

South of the inbound house are two driveways, one 42 ft. wide



Cross Section Through Offices.



Cross Section of Inbound Freight Shed.

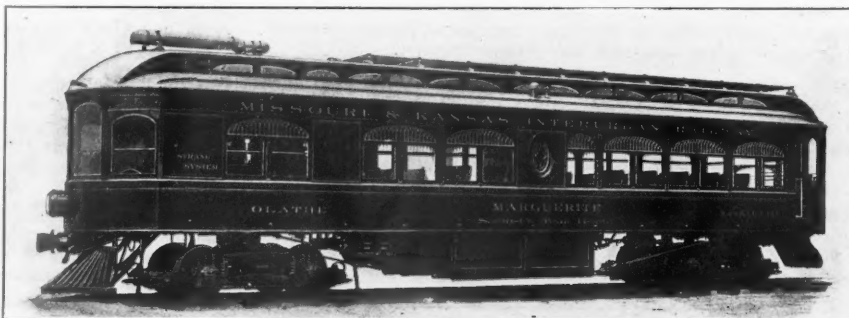
district. These yards derive their name from the fact that the Kansas-Missouri boundary line intersects them and they therefore lie partly in each of the Kansas cities, although wholly on the east side of the Kaw river. There are now under construction at these

and the other 37½ ft., with two tracks between. These driveways are built of 6 in. of concrete as a foundation, overlaid with vitrified brick on edge on a cushion of 1½ in. of sand. At the west or right-hand end of these driveways will be located a gantry crane of 25 tons capacity with a 200-ft. runway, electrically operated, for transferring heavy freight between cars, or from cars to wagons, and vice versa.

We are indebted to Mr. M. L. Byers, Chief Engineer Maintenance of Way of the Missouri Pacific, and Mr. F. B. Scheetz, Engineer Bridges and Buildings, for the foregoing data.

Strang Gasolene-Electric Car Performance.

The accompanying illustration shows a new gasolene-electric rail motor car built by the J. G. Brill Co. for the Strang Electric Railway Car Co. The experimental car "Ogerita" was described in the *Railroad Gazette* of Feb. 23, 1906, when it had been in use near Philadelphia. Since then, this first car has been sent to Kansas City under its own power, and has run in all about 18,000 miles without costing anything for repairs. In its trip west the average speed most of the way was 45 miles an hour, but snow storms and other delays made the average speed for the whole distance from Philadelphia to Kansas City 33 miles per hour. Runs were then made over various Santa Fe lines in Kansas, and in these tests the car acted particularly well in bucking snowdrifts. On the Burlington branch, which has a maximum grade of $3\frac{1}{2}$ per cent. and a maximum curvature of 16 deg., the car was stopped and started without any trouble on the steepest grades, and the average speed for the round trip of 118 miles was 27 miles per hour. The "Ogerita" is now in operation between Kansas City and Lenexa, Kan., 15 miles, making four round trips a day, and hauling one or two trailers. The "Marguerite" will soon be placed on this line also. This car is 52 ft. 9 in. long over all. The passenger compartment is 27 ft. 5 in. long, the smoking compartment 10 ft. 8 in., and the engine compartment 14 ft. 8 in. The engine is smaller than that of the "Ogerita," being of the four-cylinder vertical type, with cylinders 10 in. by 10 in., while the "Ogerita" has six cylinders.



Strang Electric-Gasolene Car "Marguerite."

Economic Wastes in Transportation.*

The vast extent of the United States, the necessity of transporting commodities great distances at low cost and the progressive-ness of railroad managers has led to an extraordinary development of one phase of rate making. This is the principle of the flat rate, based upon the theory that distance is a quite subordinate if not indeed entirely negligible element in the construction of freight tariffs under circumstances of competition. Albert Fink fully accepted this principle in his classic "Report Upon the Adjustment of Railroad Transportation Rates to the Seaboard" almost 25 years ago. Mr. J. C. Stubbs, Traffic Manager of the Harriman lines, speaking of transcontinental business in 1898, clearly expressed it as "the traditional policy of the American lines as between themselves to recognize and to practice equality of rates as the only reasonable and just rule . . . regardless of the characteristics of their respective lines, whether equal in length or widely different. . . ." Professor H. R. Meyer, formerly of the University of Chicago, both in his testimony before the Elkins Committee and in his "Government Regulation of Railway Rates," is the most prominent academic exponent of this principle. It is the theory upon which the southern basing-point system is founded; and it is the common practice in making rates into and out of New England—being, in fact, vital to the continued prosperity of this out-of-the-way territory. President Tuttle, of the Boston & Maine Railroad, has most ably supported this principle of equality of rates irrespective of distance. "It is a duty of transportation companies," he says, "to so adjust their freight tariffs that, regardless of distance, producers and consumers in every part of this country shall, to the fullest extent possible, have equal access to the markets of all parts of this country and of the world, a result wholly impossible of attainment if freight rates must be constructed upon the scientific principle of tons and miles. . . ."

This is the principle of the blanket rate attacked in the famous Milk Producers' Protective Association case in 1897, and it is the practice which has been so fully discussed of late, as generally applied to lumber rates from the various forest regions of the United States into the treeless tract of the Middle West. The principle, while applied thus generally in the construction of tariffs, is of far greater applicability in the making of special or commodity rates. Under such rates probably three-fourths of the tonnage of American railroads is at present moved. The essential principle of such special rates, constituting exceptions to the classified rates, is that of the flat rate; namely, a rate fixed in accordance with what the traffic will bear, without regard to the element of distance.

Such general acceptance, both in practice and theory, of the principle that distance is a relatively unimportant element in rate making is significant at this time, in connection with the recent amendment of the Act to Regulate Commerce. It is important also because of the marked tendency toward the adoption by various

state legislatures of the extreme opposite principle of a rigid distance tariff. The old problem of effecting a compromise between these two extreme theories by some form of long and short haul clause—the original section 4 of the act of 1887 having been emasculated by judicial interpretation—is again brought to the front. For these reasons it may be worth while to consider certain results which inevitably follow the widespread acceptance of this principle of the blanket rate. Its benefits are indeed certain; namely, an enlargement of the field of competition, and an equalization of prices over large areas, and that, too, at the level of the lowest or most efficient production. But these advantages entail certain

consequences—of minor importance, perhaps, but none the less deserving of notice.

I.

The subordination of distance to other factors in rate making is a logical derivation from the theory of joint cost. This theory justifies the classification of freight; namely, a wide range of rates nicely adjusted to what the traffic in each particular commodity will bear, while always allowing each to contribute something toward fixed and joint expenses. In the same way it explains a close correlation of the distance charge to what each commodity will bear. It assumes that any rate, however low, which will yield a surplus over expenses directly incidental to the increment of traffic and which thus contributes something toward indivisible joint costs, serves not only the carrier by increasing his gross revenue, but at the same time lightens the burden of fixed expenses upon the balance of the traffic. This principle of joint cost, so clearly set forth by Professor Taussig, is fundamental and comprehensive. It pervades every detail of rate making. But it rests upon two basic assumptions which, while generally valid, are not universally so. In the first place each increment of traffic must be *new* business, not tonnage wrested from another carrier and offset by a loss of other business to that competitor. And secondly, each increment of traffic must be *economically suitable* to the particular carriage in contemplation.

The first of these assumptions fails wherever two carriers mutually invade each other's fields or traffic. Each is accepting business at a virtual loss, all costs including fixed charges on capital being taken into account, in order to secure the increment of business. Each gain is offset by a corresponding loss. It is the familiar case of the rate war. A less familiar aspect of the matter is presented when traffic is disadvantageously carried by two competing roads, each diverting business from its natural course over the other's line. The sum total of traffic is not increased. Each carries only as much as before but transports its quota at an abnormal cost to itself. This may, perhaps, swell gross revenues; but by no process of legerdemain can the two losses in operating cost produce a gain of net revenue to both. And each increase of *unnatural* tonnage, where offset by a loss of natural business, instead of serving to lighten the common fixed charges, becomes a dead weight upon all the remaining traffic. The commonest exemplification of this is found in the circuitous transportation of goods, instances of which will be given later.

The second case in which the principle of joint cost fails to justify charges fixed according to what the traffic will bear may arise in the invasion of two remote markets by one another; or, as it might be more aptly phrased, in the overlapping of two distant markets. A railroad is simultaneously transporting goods of like quality in opposite directions. Chicago is selling standard hardware in New York, while New York is doing the same thing in Chicago. Prices are the same in both markets. Of course if the two grades of hardware are of unequal quality, or if they are like goods produced at different cost, an entirely distinct phase of territorial competition is created. But we are assuming that these are standard goods and that there are no such differences either in quality or efficiency of production. What is the result? Is each increment of business to the railroad a gain to it and to the community? The goods being produced at equal cost in both.

*From a paper by W. Z. Ripley, in the *Political Science Quarterly* for September, 1906.

places, the transportation charge must be deducted from profits. For it is obvious that the selling price cannot be much enhanced. The level of what the traffic will bear is determined not, as usual, by the value of the goods but by other considerations. The traffic will bear relatively little, no matter how high its grade.

The result is that the carrier, in order to secure the tonnage, must accept it at a very low rate, despite the length of the haul. This is the familiar case of the special or commodity rate granted to build up business in a distant market. Special rates confessedly form three-fourths of the tonnage of American railroads, as has already been said. The assumption is usually made that such traffic is a gain to the railroads, justified on the principle of joint cost as already explained. But does it really hold good in our hypothetical case? There is a gain of traffic in both directions, to be sure. But must it not be accepted at so low a rate that it falls perilously near the actual operating cost? It is possible that even here it may add something to the carriers' revenue, and thereby lighten the joint costs in other directions. But how about the community and the shipping producers? Are any more goods sold? Perhaps the widened market may stimulate competition, unless that is already keen enough among local producers in each district by itself. The net result would seem to be merely that the railroads' gain is the shippers' loss. There is no addition to, but merely an exchange of, place values. Both producers are doing business at an abnormal distance under mutually disadvantageous circumstances. It may be said, perhaps, that the situation will soon correct itself. If the freight rates reduce profits, each group of producers will tend to draw back from the distant field. This undoubtedly happens in many cases. But the influence of the railroad is antagonistic to such withdrawal. It is the railroad's business to widen, not to restrict, the area of markets. "The more they scatter the better it is for the railroads." "Keep everyone in business everywhere." And if necessary to give a filip to languishing competition, do so by a concession in rates. Is there not danger that with a host of eager freight solicitors in the field, and equally ambitious traffic managers in command, a good thing may be overdone, to the disadvantage of the railroad, the shippers and the consuming public?

An objection to this chain of reasoning arises at this point. Why need the public or other shippers be concerned about the railroads' policy in this regard? Is not each railroad the best judge for itself of the profitableness of long-distance traffic? Will it not roughly assign limits to its own activities in extending business, refusing to make rates lower than the actual incidental cost of operation? And are not all low long-distance rates, in so far as they contribute something toward joint cost, an aid to the short haul traffic? The answer will in a measure depend upon our choice between two main lines of policy: the one seeking to lower average rates, even at the expense of increasing divergence between the intermediate and the long-distance points; the other policy seeking, not so much lower rates and less discriminatory rates between near and distant points. In the constant pressure for reduced rates in order to widen markets it is not unnatural that the intermediate points, less competitive probably, should be made to contribute an undue share to the fixed sum of joint costs. The common complaint to-day is not of high rates but of relative inequalities as between places. It is a truism to assert that it matters less to a shipping point what rate it pays than that its rate, however high, should be the same for all competing places. This immediately forces us to consider the consumer. What is the effect upon the general level of prices of the American policy of making an extended market the touchstone of success, irrespective of the danger of wastes arising from overlapping markets? That the result may be a general tax upon production is a conclusion with which we shall have later to do. Such a tax, if it exists, would go far to offset the profit which unduly low freight rates in general have produced. In short, the problem is to consider the possible net cost to the American people of our highly evolved and most efficient transportation system. Our markets are so wide, and our distances so vast, that the problem is a peculiarly American one.

II.

Having stated the theory of these economic wastes, we may now proceed to consider them as they arise in practice. Concrete illustration of the effect of disregard of distance naturally falls into two distinct groups. Of these the first concerns the circuitous carriage of goods; the second, their transportation for excessive distances. Both alike involve economic wastes, in some degree perhaps inevitable, but none the less deserving of evaluation.

Recent instances of wasteful and circuitous all-rail transportation are abundant. A few typical ones will suffice to show how common the evil is. Former President Ramsey, of the Wabash, has testified as to the round-about competition with the Pennsylvania Railroad between Philadelphia and Pittsburg by which sometimes as much as 57 per cent. of traffic between those two points may be diverted from the direct route. "They haul freight 700 miles around sometimes to meet a point in competition 200 miles away." Chicago and New Orleans are 912 miles apart, and about equally distant—

2,500 miles—from San Francisco. The traffic manager of the Illinois Central states that that company "engages in San Francisco business directly via New Orleans from the Chicago territory, and there is a large amount of that business, and we engage in it right along." This case therefore represents a superfluous lateral haul of nearly a thousand miles between two points 2,500 miles apart. The Canadian Pacific used to take business for San Francisco, all-rail, from points as far south as Tennessee and Arkansas, diverting it from the direct way via Kansas City.

Goods moving in the opposite direction from San Francisco have been hauled to Omaha by way of Winnipeg, journeying around three sides of a rectangle by so doing, in order to save 5 or 6 cents per 100 lbs. Between New York and New Orleans nearly 100 all-rail lines may compete for business. The direct route being 1,340 miles, goods may be carried 2,051 miles via Buffalo, New Haven (Ind.), St. Louis and Texarkana. A generation ago conditions were even worse, the various distances by competitive routes between St. Louis and Atlanta ranging from 526 to 1,855 miles. New York business for the West was often carried by boat to the mouth of the Connecticut river, and thence by rail over the Central Vermont to a connection with the Grand Trunk for Chicago. To be moved at the outset due north 200 miles from New York on a journey to a point—Montgomery, Ala.—south of southwest seems wasteful; yet the New York Central is in the field for that business. It is nearly as uneconomical as in the old days when freight was carried from Cincinnati to Atlanta via the Chesapeake & Ohio, thence down by rail to Augusta and back to destination. Even right in the heart of eastern trunk-line territory, such things occur in recent times. The Cincinnati, Hamilton & Dayton prior to its consolidation with the Pere Marquette divided its eastbound tonnage from the rich territory about Cincinnati among the trunk lines naturally tributary. But no sooner was it consolidated with the Michigan road than its eastbound freight was diverted to the north—first hauled to Toledo, Detroit and even up to Port Huron, thence moving east and around Lake Erie to Buffalo.

A common form of wastefulness in transportation arises when freight from a point intermediate between two termini is hauled to either one by way of the other. Such cases are scattered throughout our railroad history. One of the delegates to the Illinois Constitutional Convention of 1870 cites, as an instance of local discrimination, the fact that lumber from Chicago to Springfield, Ill., could be shipped more cheaply by way of St. Louis than by the direct route. And now a generation later, it appears that grain from Cannon Falls, 49 miles south of St. Paul on the direct line to Chicago, destined for Louisville, Ky., can be hauled up to St. Paul on local rates and thence on a through billing to destination, back over the same rails, considerably cheaper than by sending it as it should properly go. The Hepburn committee reveals shipments from Rochester, N. Y., to St. Louis, Minneapolis or California, all rail, on a combination of local rates to New York and thence to destination. Presumably the freight was hauled 300 miles due east and then retraced the same distance; as New York freight for southern California is to-day hauled to San Francisco by the Southern Pacific and then perhaps 300 miles back over the same rails. Even if the rate must be based on a combination of low through rates and higher local rates, it seems a waste of energy to continue the five or six hundred miles extra haul. Yet the practice is common in the entire western territory. From New York to Salt Lake City by way of San Francisco is another instance in point. Of course a short haul to a terminal to enable through trains to be made up presents an entirely different problem of cost from the abnormal instances above mentioned.

Carriage by water is so much cheaper and as compared with land transportation is subject to such different rate-governing principles, that it deserves separate consideration. Mere distance, as has already been said, being really only one element in the determination of cost, a circuitous water route may in reality be more economical than direct carriage overland. Yet beyond a certain point, regard being paid to the relative cost per mile of the two modes of transport, water-borne traffic may entail economic wastes not incomparable to those arising in land transportation. In international trade, entirely confined to vessel carriage, a few examples will suffice for illustration. Machinery for a stamp mill, it was found, could be shipped from Chicago to San Francisco by way of Shanghai, China, for 15 cents per 100 weight less than by way of the economically proper route. Were the goods ever really sent by so indirect a route? It would appear so, when wheat may profitably be carried from San Francisco to Watertown, Mass., after having been taken to Liverpool, stored there, reshipped to Boston, thereafter even paying the charges of a local haul of nearly 10 miles; or when shipments from Liverpool to New York may be made via Montreal to Chicago, and thence back to destination. I am credibly informed that shipments of the American Tobacco Co. from Louisville, Ky., to Japan used commonly to go via Boston. Denver testimony is to the effect that machinery, made in Colorado, shipped to Sydney, Australia, can be transported via Chicago for one-half the rate for the direct shipment; and that on

similar goods even Kansas City could ship by the carload considerably cheaper by the same round-about route. Conversely straw matting from Yokohama to Denver direct must pay \$2.87 per 100 lbs.; while if shipped to the Missouri river, 500 miles east of Denver, and then back, the rate is only \$2.05.

The second great class of broken rail and water shipments consists of transcontinental business. Goods from New York to San Francisco commonly go by way of New Orleans or Galveston,* as well as by Canadian ports and routes.† In the opposite direction, goods are carried about 1,000 miles by water to Seattle or Vancouver before commencing the journey east. But more important, as illustrating this point, is the traffic from the Central West which reaches the Pacific coast by way of Atlantic seaports. As far west as the Missouri, the actual competition of the trunk lines on California business has since 1894 brought about the condition of the "blanket" or "postage stamp" rate. The same competitive conditions which open up Denver or Kansas City to New York shippers by way of New Orleans or Galveston enable the Southern Pacific Railroad or Cape Horn routes to solicit California shipments in western territory to be hauled back to New York, and thence by water all or part of the way to destination. How important this potential competition is—that is to say, what proportion of the traffic is interchanged by this route—cannot readily be determined.

Transportation over undue distances—the carriage of coals to Newcastle in exchange for cotton piece goods hauled to Lancashire—as a product of keen commercial competition may involve both a waste of energy and an enhancement of prices, in a manner seldom appreciated. The transportation of goods great distances at low rates, while economically justifiable in opening up new channels of business, becomes wasteful the moment such carriage, instead of creating new business, merely brings about an exchange between widely separated markets, or an invasion of fields naturally tributary to other centers.

A sash and blind manufacturer in Detroit was seeking to extend his market in New England. At the same time it appeared that other manufacturers of the same goods located in Vermont were marketing their product in Michigan. The burden of the complaint of the Detroit producer was not directed to this invasion of his home territory; but rather to the fact that the freight rate from Boston to Detroit, probably due to back loading, was only about one-half the rate imposed upon goods in the opposite direction, from Detroit to the seaboard. Is not this an anomalous situation? Two producers presumably of equal efficiency in production are each invading the territory naturally tributary to the other and are enabled to do so by reason of the railroad policy of "keeping everyone in business" everywhere, regardless of distance.

This record implies progressiveness, energy and ambition, on the part of both business men and traffic officers. Nothing is more remarkable in American commerce than its freedom from restraints. Elasticity and quick adaptation to the exigencies of business are peculiarities of American railroad operation. This is due to the progressiveness of our railroad managers in seeking constantly to develop new territory and build up business. The strongest contrast between Europe and the United States lies in this fact. European railroads take business as they find it. Our railroads make it. Far be it from me to minimize the service rendered in American progress. And yet there are reasonable limits to all good things. We ought to reckon the price which must be paid for this freedom of trade.

III.

The causes of economic waste in transportation are various. Not less than six may be distinguished. These are: (1) Congestion of the direct route; (2) rate cutting by the weak circuitous line; (3) pro-rating practices in division of joint through rates; (4) desire for back-loading of empty cars; (5) strategic considerations concerning interchange of traffic with connections; and (6) attempts to secure or hold shippers in contested markets. These merit consideration separately in some detail.

Congestion of traffic upon the direct line is a rare condition in our American experience. Few of our railroads are over-crowded with business. Their equipment may be overtaxed, but their rails are seldom worked to the utmost. Yet the phenomenal development of trunk-line business since 1897 sometimes makes delivery so slow and uncertain that shippers prefer to patronize railroads less advantageously located, even at the same rates. The congestion on the main stem of the Pennsylvania between Pittsburg and Philadelphia is a case in point.

Special rates or rebates often divert traffic. The weak lines (in that particular business) are persistently in the field and can secure tonnage only by means of concessions from what may be called the standard or normal rate. The differential rate is an

outgrowth of this condition. The present controversy over the right of the initial line in transcontinental business to route the freight at will involves such practices. The carriers insist that they can stop the evil only by the exercise of choice in their connections. An interesting recent example is found in the Elkins Committee testimony. It appears that lumber from points in Mississippi destined for Cleveland instead of going by the proper Ohio river gateways was diverted to East St. Louis. The operation was concealed by billing it to obscure points—Jewett, Ill., near East St. Louis, and Rochester, Ohio—and there issuing a new bill of lading to destination. Wherever a large volume of traffic is moving by an unnatural route, the first explanation which arises therefore is that rebates or rate-cutting are taking place.

A third cause of diversion of traffic is akin to the second; and concerns the practices in pro-rating. Much circuitous transportation is due to the existence of independent transverse lines of railroad which may participate in the traffic only on condition that it move by an indirect route. Recently, in a case in Texas, the Interstate Commerce Commission found that two roads thus converging on a common point were each losing to the other traffic which rightfully was tributary to its own line.

This roundabout carriage becomes, of course, increasingly wasteful in proportion to the width of angle between the main lines converging on the common point. And several cases indicate that in extreme instances the two main lines may converge on a common point from exactly opposite directions, while the transverse or secondary road or series of roads forms a wide and round-about detour. The well-known Pittsburg-Youngstown case, cited in the original Louisville & Nashville decision in 1887, serves as illustration. The Pennsylvania was competing from Pittsburg directly eastbound to New York with certain feeders of the New York Central lines which took out traffic bound for the same destination but leaving Pittsburg *westbound*. Other instances of the same phenomenon occur at Chattanooga, where freight for New York may leave either northward or southward, at Kansas City and, in fact, at almost any important inland center.

Another extreme form may even arise in the competition between two parallel trunk lines cut transversely by two independent cross roads. One of these latter may induce traffic to desert the direct route, to cut across to the other trunk line, to move over that some distance and then to be hauled back again to a point on the first main line where it may find a "cut" rate to destination. Grain sometimes used literally to meander to the seaboard in the days of active competition between the trunk lines. Wheat from Iowa and northern Illinois finally reached Portland, Me., by way of Cincinnati in this manner, with a superfluous carriage of from 250 to 350 miles.*

Whenever the cross road is financially embarrassed, the tendency to diversion is increased. For then, of course, having repudiated fixed charges, the cross line can accept almost any rate as better than the loss of the traffic. And that this was in the past almost a chronic condition in western trunk line territory appears from the fact that 18 out of the 22 roads cutting the Illinois Central between Chicago and Cairo have been in the hands of receivers since 1874.

It not infrequently happens that the initial railroad may entirely control a roundabout route, whereas shipments by the most direct line necessitate a division of the joint rate with other companies. In such a case the initial line will naturally favor the indirect route, at the risk of economic loss to the community and even to its own shippers. An interesting illustration is afforded by a complaint of wheat growers at Ritzville in the state of Washington concerning rates to Portland, Ore. By direct line with low grades along the Columbia river the distance was 311 miles. This was composed of several independent but connecting links. The Northern Pacific on the other hand had a line of its own, 480 miles long, which moreover crossed two mountain ranges with heavy grades. It based its charges upon the cost of service by this round-about and expensive line; and insisted upon its right to the traffic despite the wishes of the shippers. The Commission upheld the shippers' contention for the right to have their products carried to market in the most efficient manner. Another instance, on the Illinois Central, is suggestive, concerning shipments from Panoia, Ill., to Peoria, a distance of about 40 miles by the shortest line of connecting roads. Yet the Illinois Central having a line of its own via Clinton and Lincoln transported goods round three sides of a rectangle, a distance of 109 miles, presumably in order to avoid a pro-rating division of the through rate. Of course elements of operating cost enter sometimes, as in the case of back-loading; but in the main the pro-rating consideration rules.

A fourth cause of diversion of traffic has to do rather with the operating than the traffic department. An inequality of tonnage

*By water from New York 1,800 miles to New Orleans, with 2,489 miles by rail. Or to Galveston 2,300 miles, with 2,666 miles by rail, a total of 4,966 miles. The direct line, all rail, is about 3,300 miles. Allowing constructive mileage of 3 to 1 for water carriage, they are far from equal.

†Texas cotton bound for Yokohama by way of Seattle.

*Starting within 90 miles of Chicago, though billed due northeast to Portland, wheat has traveled first 97 miles due southwest to avail of the connection of the Baltimore & Ohio Railroad from Cincinnati, and thence north to Detroit Junction, a total of 716 miles to reach the latter point and save 5 cents in freight. The direct haul through Chicago would have been 340 miles less, or a total of 376 miles only.

in opposite directions may make it expedient to solicit business for the sake of a back load. The Canadian Pacific may engage in San Francisco-Omaha business by way of Winnipeg, because of the scarcity of tonnage eastbound. The traffic to and from the south-eastern states is quite uneven in volume. The preponderance of bulky freight is northbound to the New England centers of cotton and other manufacture; while from the western cities, the greater volume of traffic is southbound, consisting of agricultural staples and food stuffs. To equalize this traffic it may often be desirable to secure the most roundabout business. A disturbing element of this sort in the southern field has always to be reckoned with. A good illustration elsewhere occurs in the well-known St. Cloud case. The Northern Pacific accepted tonnage for a most circuitous haul to Duluth, but seems to have done so largely in order to provide lading for a preponderance of "empties." In this case it did not lower the normal rate but accepted it for a much longer haul.

Not unlike the preceding cause, also, is a fifth, the desire to be in position to interchange traffic on terms of equality with powerful connections. Mr. Bowes, Traffic Manager of the Illinois Central, justifying the participation of this road in Chicago-San Francisco business by way of New Orleans, well stated it as follows:

Of course the Southern Pacific Railroad, as you gentlemen know, originate and control a very large traffic, which they can deliver at various junctions; at New Orleans, where they have their long haul to the Missouri River, and we naturally want some of that business, a long-haul traffic to New Orleans, and in giving it to them we place them under obligations to reciprocate and give us some traffic. That is one of the things that occurs to a railroad man as to increasing the volume and value of his traffic for the benefit of his company.

A sixth and final reason for diversion of traffic from the direct line may be partly sentimental, but none the less significant. It concerns the question of competition at abnormal distances. We may cite two railroad witnesses, who aptly describe the situation. "We can haul traffic in competition, and we frequently do, as I stated, at less than cost, or nearly so, in order to hold the traffic and our patrons in certain territory—Kansas City for instance—but we do not like to do it." Or again, "The Charleston freight is not legitimately ours. . . . We make on these through routes from Chicago to Charleston, for instance, scarcely anything. But it is an outpost. We must maintain that or have our territory further invaded." In other words, the circuitous or over-long distance haul is a natural though regrettable outcome of railroad competition.

IV.

What are the effects of this American practice of unduly disregarding distance as a factor in transportation? Not less than five deserve separate consideration in some detail. It inordinately swells the volume of ton-mileage; it dilutes the ton-mile revenue; it produces rigidity of industrial conditions; it stimulates centralization both of population and of industry, and it is a tax upon American production.

One cannot fail to be impressed with the phenomenal growth of transportation in the United States, especially in recent years. It appears almost as if its volume increased more nearly as the square of population than in direct proportion to it. Our population from 1889 to 1903 increased slightly less than one-third. The railroad mileage grew in about the same proportion. Yet the freight service of American railroads surpassed this rate of growth almost five times over. While population and mileage increased one-third, the railroads in 1903 hauled the equivalent of two and one-half times the total volume of freight traffic handled in 1889. In other words, the ton mileage—representing the number of tons of freight hauled one mile—increased from 68,700,000,000 to 173,200,000,000. Do these figures represent all that they purport to show? Every ton of freight which moves from Chicago to San Francisco over a line 1,000 miles too long adds 1,000 ton-miles to swell a fictitious total. Every carload of cotton goods hauled up to Chicago to be redistributed thence in the original territory and every ton of groceries or agricultural machinery exchanged between two regions with adequate facilities for production of like standard goods contribute to the same end. How large a proportion of this marvelous growth of ton-mileage these economic wastes contribute can never be determined with certainty. That their aggregate is considerable cannot be questioned.

These practices must considerably dilute the returns per mile for service rendered by American carriers—in ever greater degree than they enhance the apparent volume of transportation. Long-distance rates must always represent a low revenue per ton-mile, owing to the fixed maximum for all distances determined by what the traffic will bear. Furniture made in North Carolina for California consumption cannot be sold there in competition above a certain price. The greater the distance into which the possible margin of profit is divided, the less per mile must be the revenue left for the carrier. Yet this is not all. Such would be true of simply over-long distance carriage. But to this we must add the fact that some of this long-haul tonnage reaches its remote destination over a roundabout line, which increases the already over-long

carriage by from 25 to 75 per cent. It is apparent at once that a still greater dilution of the average returns must follow as a result. From 1873 down to 1900 the long and almost uninterrupted decline of rates is an established fact. Has the volume of this economic waste increased or diminished in proportion to the total traffic throughout this period? If it is relatively less to-day, at a time when ton-mile rates are actually rising, it would be of interest to know how far such economies offset the real increases of rates which have been made. Rates might conceivably rise a little, or at all events remain constant, coincidentally with a fall in ton-mile revenue produced through savings of this sort.

The third result of undue disregard of distance is a certain inelasticity of industrial conditions. This may occur in either of two ways. The rise of new industries may be hindered, or a well-merited relative decline of old ones under a process of natural selection may be postponed or averted. The first of these is well set forth in the Elkins Committee hearings.

It is always considered desirable to have a long haul, and the rates on a long haul should be much less, in proportion to distance, than on a short haul. This is a principle of rate-making which has grown up as one of the factors in the evolution of the railroad business in this country, and it has greatly stimulated the movement of freight for long distances, has brought the great manufacturing centers in closer touch with the consumer at a distance and the producer in closer touch with centers of trade. It has been of undoubted benefit to both, though it may oftentimes retard the growth of new industries by a system of rates so preferential as to enable the manufacturer a long distance from the field of production of raw material to ship the raw material to his mills, manufacture it and return the manufactured goods cheaper than the local manufacturer could afford to make it, and thus, while building up the centers of manufacture, have retarded the growth of manufacturing in the centers where the raw material is produced.

The other aspect of industrial rigidity is manifested through the perpetuation of an industry in a district, regardless of the physical disabilities under which it is conducted. Another quotation describes it well.

Senator Carmack.—Is it the policy of the roads, wherever they find an industry established, to keep it going by advantages in the way of rates regardless of changes in economic conditions?

Mr. Tuttle.—I think in so far as it is possible for them to do so. It has not been possible in all cases. We could not keep iron furnaces running in New England; they are all gone.

One cannot for a moment doubt the advantages of such a policy as a safeguard against violent dislocating shocks to industry. It may render the transition to new and better conditions more gradual and easier to bear. It has been of inestimable value to New England, as exposed to the competition of newer manufactures in the central west. But on the other hand, it is equally true that in the long run the whole country will fare best when each industry is prosecuted in the most favored location—all conditions of marketing as well as of mere production being considered. If Pittsburgh is the natural center for iron and steel production, it may not be an unmixed advantage to the country at large, however great its value to New England, to have the carriers perpetuate the barbed wire manufacture at Worcester. Each particular case would have to be decided on its merits. My purpose at present is not to pass judgment on any of them but merely to call attention to the effect of such practices upon the process of industrial selection.

Centralization, or concentration of population, industry and wealth is characteristic of all progressive peoples at the present time. Great economic advantages, through division of labor and cheapened production have resulted; but on the other hand, manifold evils have followed in its train. The results are too well known to need mention in this place. From the preceding paragraph it would appear that American railroad practices operate in some ways to retard this tendency. But much may be adduced in favor of the opposite view. Many staple industries utilizing the raw material at their doors might supply the needs of their several local constituencies were it not that their rise is prevented by low long-distance rates from remote but larger centers of production. Denver, in striving to establish paper mills to utilize its own Colorado wood pulp, is threatened by the low rates from Wisconsin centers. Each locality ambitious to become self-supporting is hindered by the persistency of competition from far away cities. This is particularly true of distributive business. The overweening ambition of the great cities to monopolize the jobbing trade, regardless of distance, has already been discussed. And it follows, of course, that the larger the city, the more forcibly may it press its demands upon the carriers for low rates to the most remote hamlets. The files of the Interstate Commerce Commission are stocked with examples of this kind. The plea of the smaller cities and the agricultural states—Iowa for example—for a right to a share in the distributive trade naturally tributary to them by reason of their location formed no inconsiderable element in the recent popular demand for legislation by the Federal government.

In the fifth place, every waste in transportation service is in the long run a tax upon the productivity of the country. More men may be employed, more wages paid, more capital kept in

circulation; but it still remains true that the coal consumed, the extra wages paid and the rolling stock used up in the carriage of goods either unduly far or by unreasonably roundabout routes constitute an economic loss to the community. In many cases, of course, it may be an inevitable offset for other advantages. In the Savannah Freight Bureau Case the facts showed Valdosta, Ga., to be 158 miles from Savannah, while it was 275 and 413 miles by the shortest and longest lines respectively from Charleston. Valdosta's main resource for fertilizer supplies, other things being equal, would naturally be Savannah, the nearer city. Yet in the year in question it appeared that nine-tenths of the supply was actually drawn from Charleston; and much of it was hauled 413 instead of a possible 158 miles. No wonder the complainants alleged "that somebody in the end must pay for that species of foolishness."

V.

What remedy is possible for these economic wastes? Both the carriers and the public have an interest in their abatement. The more efficient industrial combinations have taken the matter in hand, either by strategic location of plants or, as in the case of the United States Steel Corporation, by the utilization of a Pittsburgh base price scheme, with freight rates added. But probably the larger proportion of tonnage is still shipped by independent and competing producers. To this traffic the railroads must apply their own remedies. Either one of two plans might be of service. The right to make valid agreements for a division either of traffic or territory, if conceded to the carriers by law under proper governmental supervision, would be an effective safeguard. This would mean the repeal of the present prohibition of pooling. Or a re-enactment of the long and short haul clause, now emasculated by judicial interpretation, would do much toward accomplishing the same result.

Agreements between carriers previous to 1887 were often employed to obviate unnecessary waste in transportation. The division of territory between the eastern and western lines into the southern states is a case in point. Thirty years ago competition for trade throughout the South was very keen between the great cities in the East and in the Middle West. Direct lines to the Northwest from Atlanta and Nashville opened up a new avenue of communication with ambitious cities like Chicago, St. Louis and Cincinnati. The state of Georgia constructed the Western & Atlantic Railroad in 1851 for the express purpose of developing this trade. As western manufactures developed, a keen rivalry between the routes respectively east and west of the Alleghany Mountains into the South was engendered. A profitable trade in food products by a natural, direct route from the Ohio gateways was, however, jeopardized by ruinous rates made by the warring trunk lines to the northern seaboard. Corn, oats, wheat and pork came down the coast and into the South through the back door, so to speak, by way of Savannah and other seaports. On the other hand the eastern lines into the South were injuriously affected by the retaliatory rates on manufactured goods made by the western lines for shipments from New York and New England. Freight from each direc-

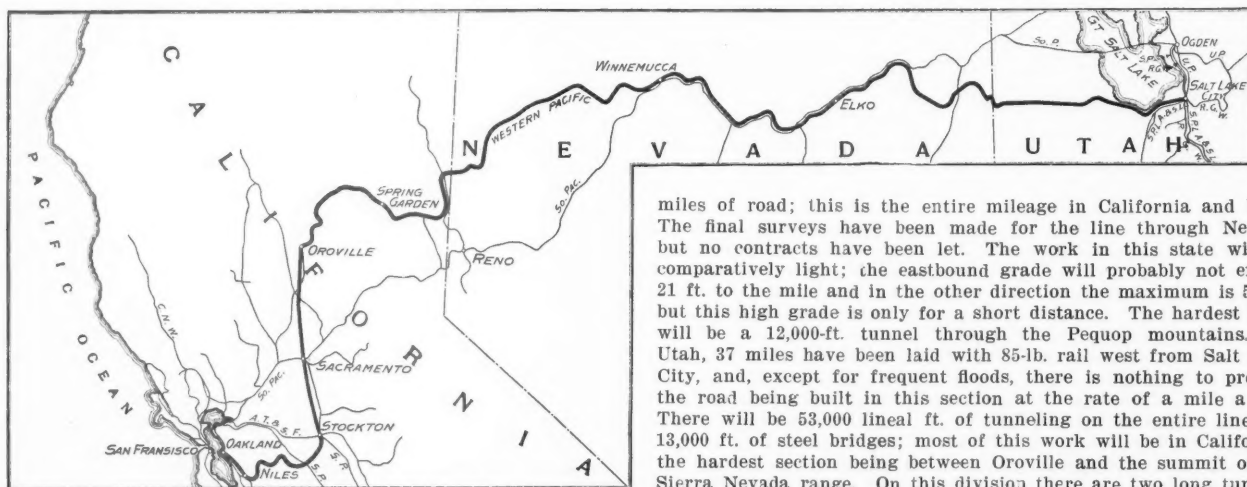
eastern side of the boundary. Western competitors were to do the same. The result was the recognition of natural rights of each to its territory. This agreement has now formed the basis of railroad tariffs into the Southern states for almost a generation. Similar agreements, on a less extensive scale, are commonly used to great advantage. Thus in the "common point" territory formerly tributary to Wilmington, Savannah and Charleston, the first named city insisted upon its right to an equal rate with the other two, no matter how great the disparity of distance. The Southern Railway and Steamship Association arbitrated the matter, fixing a line beyond which Wilmington was to be excluded. Obviously such agreements have no force in law at the present time. The only way to give effect to them is for connecting carriers to refuse to make a joint through rate. This effectually bars the traffic. Moreover entire unanimity of action is essential. Every road must be a party to the compact. Otherwise the traffic will reach its destination by shrunken rates and a more circuitous carriage even than before.

One cannot fail to be impressed in Austria and Germany with the economic advantages of an entirely unified system of operation. No devious routing is permitted. Certain lines are designated for the heavy through traffic, and concentration on them is effected to the exclusion of all others. Between Berlin and Bremen, for example, practically all through traffic is routed by three direct lines. No roundabout circuits occur because of the complete absence of railroad competition. No independent lines have to be placated. The sole problem is to cause the tonnage to be most directly and economically transported. And this end is constantly considered in all pooling or through-traffic arrangements with the railroad systems independently operated.

Suppose a long and short haul clause to be re-enacted, exemption from its provisions to be granted only by the Interstate Commerce Commission, what would be the result? In the vast majority of cases the roads would prefer to withdraw from the unreasonably distant fields. Simultaneously taken by each line such action would put an end to the economic waste. At the same time it would terminate one of the most persistent causes of rebates and personal favoritism. To be sure it would generally operate in favor of the strong, direct lines as against the weak and roundabout ones. Great benefit would accrue to the Pennsylvania, the Illinois Central or the Union Pacific Railroads. The activities of the parasitic roads and the scope of parasitic operations by the substantial roads would inevitably be curtailed. Much justice would be done and much local irritation and popular discontent would be allayed.

Western Pacific.

It is now expected that the Western Pacific will be completed in about two years. It will be 924 miles long, running from San Francisco, Cal., to Salt Lake City, Utah, where it will connect with the lines of the Denver & Rio Grande system. Contracts have been let for grading, tunneling and trestling on about 480



Route of the Western Pacific.

tion was being hauled round three sides of a rectangle. Finally in 1878 a reasonable remedy was found in a division of the field and an agreement to stop all absurdly circuitous long hauls into one another's natural territory. A line was drawn through the Northern states from Buffalo to Pittsburg and Wheeling; through the South from Chattanooga by Montgomery, Ala., to Pensacola. Eastern lines were to accept goods for shipment only from their side of this line to points of destination in the South also on the

miles of road; this is the entire mileage in California and Utah. The final surveys have been made for the line through Nevada, but no contracts have been let. The work in this state will be comparatively light; the eastbound grade will probably not exceed 21 ft. to the mile and in the other direction the maximum is 53 ft., but this high grade is only for a short distance. The hardest work will be a 12,000-ft. tunnel through the Pequop mountains. In Utah, 37 miles have been laid with 85-lb. rail west from Salt Lake City, and, except for frequent floods, there is nothing to prevent the road being built in this section at the rate of a mile a day. There will be 53,000 lineal ft. of tunneling on the entire line and 13,000 ft. of steel bridges; most of this work will be in California, the hardest section being between Oroville and the summit of the Sierra Nevada range. On this division there are two long tunnels, one at Spring Garden, 7,300 ft. long, of which something over 1,500 ft. has been pierced, and the other 6,000 ft. long at the summit of the range. Through the Coast range near Niles, Cal., there is a 4,000 ft. tunnel of which the portals have been completed and progress is being made in the tunnel itself. The first track laying in California will be started near Oroville. It has been reported that the Western Pacific has bought the Boca & Loyalton and the Virginia & Truckee, which together would give the company an important feeder line from Virginia City, which is south of Reno, Nev., northerly to a connection with the Western Pacific near the

California-Nevada state line, but officials of the company state that nothing in regard to the acquisition of branch lines has been done or will be done until the main line is built. There is at present great difficulty in getting labor; wages in the neighborhood of San Francisco are excessively high and at present the company is advertising in the east for 5,000 men.

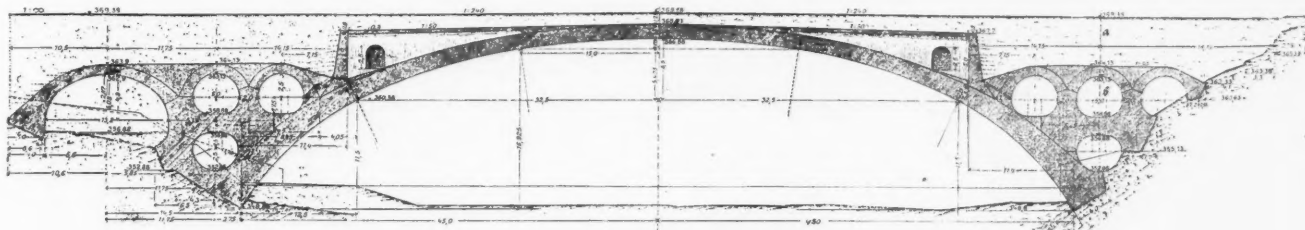
The Syratl Viaduct in Plauen, Bohemia.

BY E. OMMELANGE.

The Syratl Viaduct, which has recently been completed, is situated within the city of Plauen, where it carries a main thoroughfare connecting the city with its suburbs. The arch ring of this engineering work has the largest construction span that has ever been built in stone, in Europe; it is 295 ft. 3 in. long. The first matter for consideration in the construction of such a span was the nature and crushing resistance of the material on either

on either side of the arch, which was raised progressively according to the requirements of the work. The rail track was of 2 ft. gage. The intrados has a composite radius struck from five points. These radii are 344 ft. for the center and 192 ft. and 98 ft. on either side. The rise from the constructive chore is 59 ft. The voussoirs of the arch ring as well as all other facing stones are of phyllit-schist, quarried in the neighborhood of Plauen.

The progress of the work was as follows: After loading the temporary bridge with the dead weight which it was ultimately to carry, the intrados and the vertical faces of the arch ring were faced with cement. The voussoirs were then built up to the mortared faces, the whole thus forming one integral mass. The lagging boards of the arch are of pine and were used just as left by the saw; those for the vertical faces of the arch ring were dressed and planted with narrow fillets to mould the cement sheeting in imitation of a triple ring of voussoirs. The cement used for the facings is made of pure quartz sand; and the cement mortar employed for the arch is the Portland "Star" brand from Stettin,

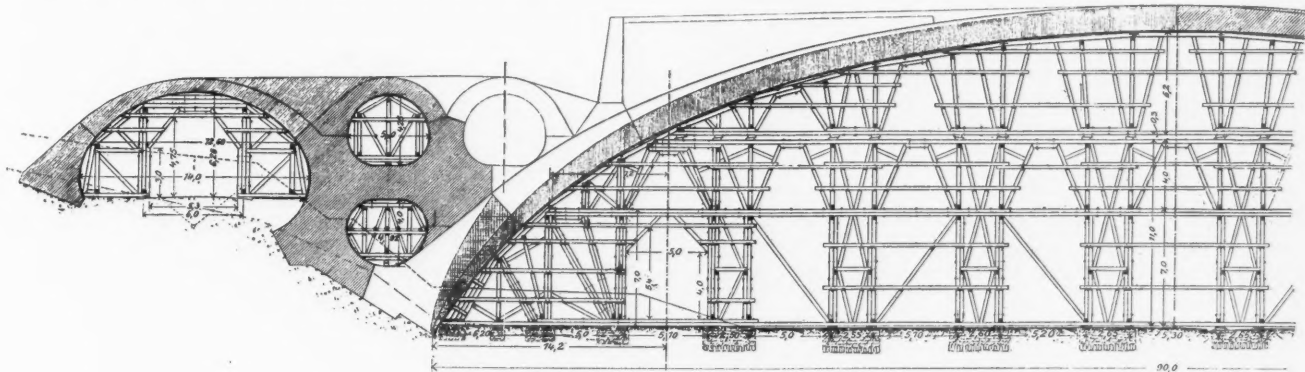


General Elevation, Plauen Viaduct.

bank, and this, as it happened, was particularly well adapted for the abutments, being a schistic rock having a crushing resistance of 1,830 kilos per square centimeter. It was owing to this fact, which influenced largely the question of the cost of the work, that in the competition of construction designs which were submitted to the municipality of Plauen the result was that structural iron-work was beaten by stone.

The preparation for the foundations consisted principally in filling up a few old mining shafts and tunnels, which were all solidified with cement. In order to arrive at the perfectly sound hard rock, the arch footings had only to be carried down 4 ft. 11 in. to 6 ft. 7 in. below the original surface line. Considering closely the monolithic character of the viaduct, it will be seen that the solid mass of the haunch answers to the conditions of a balanced pier, while the real import of the arch springings is intersected by a

mixed in a proportion of one for four of rock sand. The crushing resistance of the arch mortar was 320 kilos per square centimeter after the thirteenth week, and 370 kilos per square centimeter after the twenty-sixth week; the respective tensile strengths on the days mentioned were 15 kilos and 18 kilos per square centimeter. The tests on dried specimens proved its resistance after 24 weeks at over 600 kilos per square centimeter. The thickness of the dressed stones for the arch ring and facings for haunches ranges from $3\frac{13}{16}$ to $4\frac{1}{4}$ in. The thickness of the arch ring is 14 ft. 10 in. at the abutments, 7 ft. $2\frac{1}{2}$ in. at the imposts of the springings and 4 ft. 11 in. at the crown. The whole core of the bridge masonry is ashlar set in the mortar already mentioned. This includes the not cement faced piers of the inner traversing walls. After the arch ring was keyed at the crown, the sections at the haunches were filled and keyed. The key blanks started from the springings of



Falsework, Main Span of Plauen Viaduct.

chord of 213 ft. 3 in., from which statum the rise is only 21 ft. 3 in.

The stratification of the rock for the abutments varies from nearly perpendicular to an inclination of 45 deg. The banks were cleared for the foundations following the natural conformation of the ground, the form of the foundations resembling a series of steps having the average total angle of about 45 deg. on the right hand bank and of 30 deg. on the left hand bank. The wide opening on the left hand bank is to serve for a street railway. The foundations for the falseworks were of rammed concrete filled into sixteen trenches traversing the line of the viaduct, and designed to offer a maximum resistance under all angles of thrust.

The timber for the arch centers and stagings for the greater part was of spruce. In the main structure all the timbers are squared, and have in general a section of 7.87 x 7.87 in. The temporary arch comprised three stages; the whole of the work was effected by hand haulage, without the use of any derricks or power machines, owing to the facilities offered by the high banks on either shore. Every need of the work was served by a light bridge

the arch ring just above the footings of the third staging. There were eight such key sections extending through the whole width of the arch and having widths varying from 3 ft. $3\frac{3}{4}$ in. to 8 ft. $2\frac{7}{16}$ in., and kept open by rows of struts or corresponding lengths. When the arch ring was closed, the total inflexion at the center of the falsework was 1 in. The haunches of the construction are lightened transversely by small arches, with inverts forming four on one side of the bridge, and three on the other, each having a maximum diameter of 16 ft. 5 in., and with curves struck from various centers, principally of 8 ft. $2\frac{7}{16}$ in. and 6 ft. $6\frac{1}{4}$ in. radius. The length of the archway at the left hand side, which will be used for the passage of a tramway, as already mentioned, is 45 ft. 11 in., and its height from the roadway is 20 ft. 7 in.; its curves are struck from three centers of 26 ft. 3 in., 13 ft. 1 in. and 7 ft. 6 in. radius. Longitudinally and on a length of 53 ft. 5 in. over the arch springings, there are five internal pier walls or ribs, having a thickness of 1 ft. $3\frac{3}{4}$ in.; these pier walls also lighten the dead weight.

The total length of the viaduct is 492 ft., and over copings the

width of the bridge is 56 ft. The masonry of the work is carried up over the arch springings by the rib walls, so that the depth there of the fillings is only 4 ft. 11 in. The slope at the return or end wall of the ribs is 3 ft. 7 ¹/₁₆. This masonry is backed with cement and then covered with tarred felt of from ¹³/₃₂ in. to ¹⁵/₁₆ in. thick, 3 ft. 3 ³/₈ in. wide, and laid in lengths of 32 ft. 10 in. to 39 ft. 4 in. The profile of the masonry work in both the longitudinal and cross sections, where in contact with the filling up, is entirely covered with this asphaltum. Drainage of the superincumbent mass of earth is effected at the deepest part of the filling up: i. e., at the arch springings, by means of pipes passing through the felt into the nearest upper traversing archway, and thence into the lower archway, where a side drain carries off the water. At the outer extremities of the masonry work the drainage is effected direct into the foundations. On either side of the bridge there are wide footpaths of 10 ft. breadth. The footpath parapets have ornamental cast iron standards and wrought iron railings.

The total load on the abutments is of about 15,000 tons, and the pressure on the foundations is 24 kilos per square centimeter.

The total cost of the whole structure was only \$125,000, owing to the abundance of stone in the vicinity, and to the low cost of German labor.

Train Accidents in the United States in August.¹

dn, 3d, Buffalo, Rochester & Pittsburg, Harmony, Pa., a freight train was derailed at a misplaced switch and a number of cars were wrecked. Three trainmen were killed.

eq, 3d, Chicago & North-Western, Elgin, Ill., a car in a passenger train was derailed by a defect in a truck and was overturned. Nine passengers were injured.

unx, 3d, Michigan Central, Hartsdale, Ind., a freight train was derailed and wrecked; conductor killed, four other trainmen injured.

unf, 4th, Delaware, Lackawanna & Western, Syracuse, N. Y., a locomotive was derailed by an accidental obstruction and the engine was overturned. The engineman was badly scalded.

bc, 5th, St. Louis & San Francisco, St. Genevieve, Mo., butting collision between a passenger train and a freight due, it is said, to a misplaced switch. Both engines were wrecked and 20 passengers were injured.

xc, 5th, Cleveland, Akron & Columbus, Silver Lake, Ohio, collision of passenger trains, one of which was entering a side track; one smoking car overturned; 12 passengers injured.

*6th, 11 p.m., Pittsburg, Cincinnati, Chicago & St. Louis, Pittsburg, Pa., an eastbound passenger train was derailed at a switch and the baggage car was overturned and took fire. Two trainmen were killed.

xc, 8th, Western Maryland, Porters, Pa., collision of freight trains; one man killed, one injured.

xc, 8th, Vandalia, Indianapolis, Ind., collision of work trains; one employee killed, five injured.

unx, 8th, Southern Railway, Woodville, Ala., a freight train was derailed and the engine and eight cars were wrecked. A brakeman was killed.

rc, 9th, Baltimore & Ohio, Lodi, Ohio, an empty engine ran into the rear of a preceding passenger train; fireman killed, engineman injured.

unx, 9th, Cincinnati, New Orleans & Texas Pacific, Glenmary, Tenn., the engine and baggage car of passenger train No. 4 were derailed and fell down a bank, and they cleared the tracks so quickly that the rest of the train ran on some distance and was not derailed. The fireman was killed and the engineman injured.

rc, 10th, Baltimore & Ohio, Clarington, W. Va., a passenger train ran into the rear of a preceding freight, making a bad wreck; three trainmen injured.

unx, 10th, 1 a.m., Fort Worth & Denver City, Fruitland, Tex., a passenger train was derailed and two passenger cars fell down a bank. Fifty-five persons were injured.

rc, 11th, Pennsylvania, Franklin, Pa., rear collision of freight trains; one trainman killed and one fatally injured.

dr, 11th, Chicago, Indianapolis & Louisville, Rensselaer, Ind., passenger train No. 30 was derailed by spreading of rails while

running at high speed, and the engine and first two cars fell down a bank. Twelve passengers were injured.

†bc, 13th, Chicago, Rock Island & Gulf, Fort Worth, Tex., butting collision of passenger trains, due, it is said, to misunderstanding of orders. Two passengers were killed and 12 injured.

†o, 13th, Atchison, Topeka & Santa Fe, McCook, Ill., an excursion passenger train broke in two and the rear portion, which consisted of one car, was stopped so suddenly that two passengers standing on the front platform of the car were thrown off. One of them was killed and the other badly injured.

xc, 14th, Fort Scott, Kan., a freight train of the St. Louis & San Francisco ran into a northbound passenger train of the Missouri, Kansas & Texas at the crossing of the two roads, overturning a chair car. Seven passengers were injured.

dr, 14th, Southern Railway, South Hill, Va., a passenger train was derailed at a point where the track had been weakened by the washing out of a culvert, and all of the five cars in the train were overturned. Four passengers and two trainmen were injured.

bc, 15th, 9 p.m., Seaboard Air Line, Portsmouth, Va., butting collision in the yard between a train of empty passenger cars and a switching freight train, both trains running backward. Three employees were injured, one of them fatally.

xc, 15th, Long Island road, Port Washington, N. Y., a passenger train, from which the engine had been detached, was run into the station at uncontrollable speed and collided with a parlor car standing at the end of the track. Three passengers were injured.

dr, 15th, Southern Railway, Rocky Mount, Va., the rear car in a passenger train was derailed by bad track and was overturned.

unx, 15th, Southern Railway, Redwood, Va., two cars in a mixed train were derailed and two trainmen and three passengers were injured.

unx, 17th, Texas & Pacific, Forney, Tex., the tender of the engine of a passenger train was derailed on a curve and, with the mail car, fell down a bank. The vestibules of most of the passenger cars were so badly crushed that the passengers had to get out of the cars through the windows. Six passengers were injured, most of them but slightly.

o, 17th, Birmingham Southern, Ensley, Ala., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineman and fireman were killed.

xc, 18th, Oregon Short Line, Dillon, Mont., passenger train No. 10 ran over a misplaced switch and into the rear of a freight train standing on the side track. The conductor of the freight was killed and the engineman and fireman of the passenger were injured.

dn, 18th, 8 p.m., Lake Shore & Michigan Southern, Elyria, Ohio, the Twentieth Century Limited Express eastbound was derailed at the derailing switch at the approach to the crossing of the Baltimore & Ohio, and the engine was ditched. The fireman was seriously injured.

rc, 19th, Pennsylvania road, Sang Hollow, Pa., a work train, occupied by a large gang of workmen, most of them asleep in the caboose, was run into, while standing at a water station, by a following freight train, and the caboose and the car next to it were wrecked. Seven employees were killed and 10 were injured, three of them fatally. It is said that the freight had been ordered to run under control, expecting to find the work train in the block section, but that the engineman had increased his speed in order to take water from a trough; and that a heavy rain falling at the time prevented him from seeing the red lights on the tail end of the work train.

dn, 19th, Mobile & Ohio, Berkeley, Ky., an excursion passenger train was derailed at a misplaced switch and the engine and first three cars were overturned. The fireman was injured.

xc, 20th, Michigan Central, Charlotte, Mich., a locomotive backed into the caboose of a work train while the workmen were inside the car eating, and although the collision was not very serious it caused the death of three laborers and the injury of 17 or more, two of them fatally.

bc, 21st, St. Louis & San Francisco, Knobview, Mo., butting collision between a passenger train and a freight, due, it is said, to misinterpretation of orders by the freight. One passenger, one express messenger and one fireman were injured.

bc, 21st, Baltimore & Ohio Southwestern, Seymour, Ind., westbound passenger train No. 5 ran over a misplaced switch and into the head of a freight train standing on the side track, wrecking both engines. Three trainmen were injured.

bc, 21st, Central New England, Silvernails, N. Y., butting collision between passenger train No. 7 and freight train No. 30, badly damaging both engines; three employees injured.

dn, 21st, Cleveland, Cincinnati, Chicago & St. Louis, Taft, Ind., the engine and first two cars of passenger train No. 5 were derailed at a derailing switch, and the engine was overturned. The engineman and fireman were killed.

xc, 23d, Pennsylvania road, Olean, N. Y., collision between a switching engine and a freight train; one fireman killed and the engineman badly injured.

xc, 23d, New York Central & Hudson River, Syracuse, N. Y., a

¹Accidents in which injuries are few or slight and the money loss is apparently small, will, as a rule, be omitted from this list. The official accident record, published by the Interstate Commerce Commission quarterly, is regularly reprinted in the *Railroad Gazette*. The classification of the accidents in the present list is indicated by the use of the following

ABBREVIATIONS.

- rc Rear collisions.
- bc Butting collisions.
- xc Miscellaneous collisions.
- dr Derailments; defects of roadway.
- eq Derailments; defects of equipment.
- dn Derailments; negligence in operating.
- unf Derailments; unforeseen obstruction.
- unx Derailments; unexplained.
- o Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

switching engine collided with some freight cars and the wreck fell against a dwelling house, partly wrecking it and causing the death of a man sleeping in a bed in the first story of the house, some of the timbers of the second story falling on him.

*rc, 24th, Seaboard Air Line, Kilby, Va., rear collision of freight trains, wrecking several cars, which took fire and were burned up. Three trainmen injured.

unf, 24th, Virginia & Southwestern, Moccasin Gap, Va., a freight train broke through a trestle bridge which had been weakened by

A 600-Ton 90-in. Hydraulic Wheel Press.

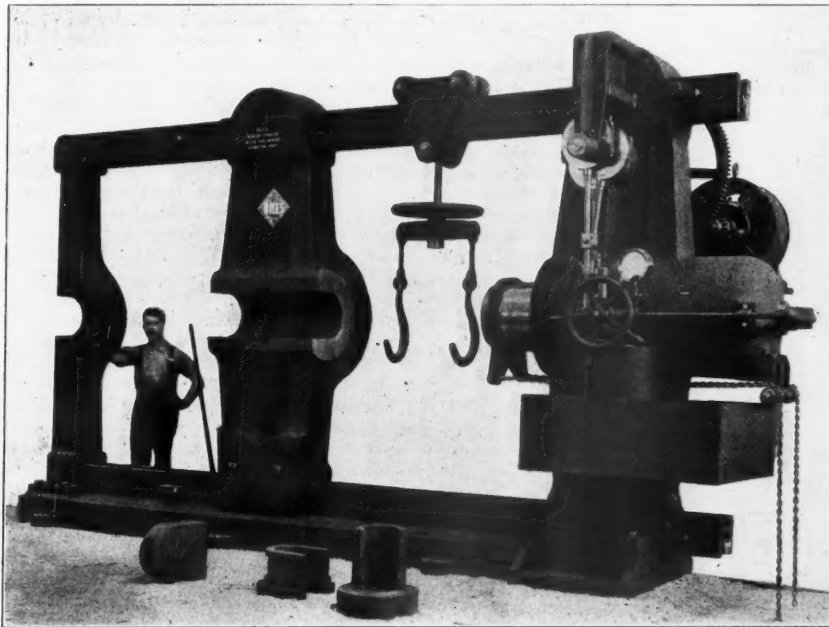
The increase in the use of wheels with steel tires has caused several changes to be made in railway repair shop equipment. Until very recently hydraulic wheel presses of more than 400 tons capacity had not been known. Many shops have found difficulty in removing steel tired wheels from their axles, due to the great pressure caused by shrinking on the tires after the usual pressure of 150 tons has been exerted to place the wheel center on the axle. In some instances it has been necessary to remove the tires or drill the hub to start the center.

Realizing the importance of a machine of such capacity as to eliminate these difficulties, the Niles-Bement-Pond Co., New York, has placed on the market a newly designed hydraulic wheel press of 600 tons capacity, which has met with much favor.

The distance between the ram and the resistance post, which is a steel casting, is 8 ft. 3 in. Four tension bars are used instead of two, and the post is arranged so that the weight is entirely removed from the tension bars. The cylinder, which is made of cast steel, has an outside diameter of 27 in. The pump, which has three plungers, is on the side of the machine handy for the operator. A 12½-h.p. motor is used to operate the pump. The height between the tension bars is 90 in., and the machine will take wheels 84 in. in diameter on the tread.

The machine is mounted on a base plate, but no strains are transmitted to it, as all pressure is taken by the tension bars. The cylinder is lined with copper expanded into place and burnished. The piston is packed with best cup leather, is tight, durable, and causes little friction. The ram is counterweighted for quick return when the release valve is open. The safety valve can be set to open at a desired pressure, and is protected from tampering by a lock box. The

pressure gage is graduated for tons of pressure and for pounds per sq. in. on the ram. The water tank is bolted under the cylinder, and takes the discharge and supplies the pumps. Several of these machines are now in use.



Niles 90-in. 600-ton Capacity Hydraulic Wheel Press.

a freshet, and the engine and five loaded cars fell into the stream and were wrecked. Two trainmen were killed and a third was injured.

bc, 25th, Bessemer & Lake Erie, Milltown, Pa., butting collision of freight trains, both running at good speed. Two trainmen were killed and three injured.

unx, 24th, Central of Georgia, Columbus, Ga., a freight train was derailed and two trainmen were injured.

unx, 25th, Central of Georgia, Columbus, Ga., the tender of the locomotive of a passenger train was derailed, and, with the engine and two cars, was ditched, making a bad wreck. Two passengers and two trainmen were injured.

xc, 25th, Maine Central, Pittsfield, Me., collision between a passenger train and two freight cars which had escaped control while being switched on a grade, wrecking both freight cars and badly damaging the engine and first two cars of the passenger train. A traveling engineer on the passenger train was killed and the engineman and two other employees were injured.

unx, 26th, Great Northern, Swift, Montana, a passenger train was derailed and one car was overturned; two passengers and one trainman were killed and eight passengers were injured.

o, 26th, New York Central & Hudson River, Little Falls, N. Y., the locomotive of a freight train was wrecked by the explosion of its boiler and the engineman and fireman were killed.

xc, 29th, New York Central & Hudson River, Fordham, N. Y., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking several cars. A part of the wreck fell on the adjacent main track and was run into by a passenger train. One brakeman was killed and two other trainmen were injured.

xc, 30th, Pennsylvania, Ebenezer, N. Y., a passenger train drawn by two engines collided while running at full speed with a switching engine, badly damaging all three locomotives. Two enginemen were injured, one of them being severely scalded.

dr, 30th, Buffalo & Susquehanna, Cross Fork, Pa., a freight train consisting of an engine and five loaded cars was derailed at a point where the roadbed had been softened by rain, and the whole train fell to the bottom of the ravine at the side of the road. The engineman was fatally scalded.

unx, 30th, Sandy River, Phillips, Me., a passenger train consisting of an engine and three cars was derailed and overturned. All but a few of the 75 passengers escaped serious injury.

unf, 31st, Atlantic Coast Line, Ivanhoe, N. C., a mixed train was derailed at a washout and eight freight cars were ditched. One brakeman was killed.

American Railroads—A German View.

II.

In the twelfth chapter of the report by the visiting members of the German Railroad Council there is a general review of the situation, part of which we reprint, as follows:

Among laymen one often finds the idea that American railroads excel those of the rest of the world in some extraordinary fashion, by gigantic buildings, by overwhelming traffic, by splendidly equipped cars or incredibly great speed of travel; in short, by performances in the most difficult branches of railroading which put the traffic men of the old world to shame. And when an American member of the railroad fraternity shows us, most obligingly, the structures and traffic arrangement of his roads he often seems to be of the same opinion and looks down upon the visitor in a benevolent manner while he expects that the visitor will betray an attitude of surprise and humility. As a matter of fact, after an earnest study of the American railroad system, without prejudice and with due regard to the excellent performances actually made by American railroads, especially their great merit as developers of the country, we did not find the general condition either better or worse than that existing in Germany.

It must be kept in mind in expressing such an opinion that a stranger cannot always estimate clearly the traffic requirements which have to be met; therefore, we repeat a few figures out of the previous part of our report which shows a comparative synopsis of the extent of railroad traffic in America and in Germany.

The railroads of the United States, with a length of some 205,000 miles (1903)—more than ten times the length of the united Prussian and Hessian state railroads—without question have to handle a remarkable traffic. During the year covered by our report (July 1, 1902, to June 30, 1903) they had to carry 694,891,535 persons, who traveled almost 21 billion passenger-miles. In the Prussian-Hessian railroad system, with a length of only 31,764 miles, the number of persons carried amounted to 608,864,990, and passenger-miles amounted to 9½ billions. Thus our traffic, too, was considerable. A traffic 10 per cent. larger in number of persons carried and 2¼ times greater in passenger-miles yielded the American rail-

roads an income 4.65 times greater than the income derived from the passenger traffic of the Prussian-Hessian railroad system.

The difference in freight traffic was more striking. Here the railroads of the United States had to move 579,392,197 tons, amounting to about 171½ billions of ton-miles, while in Prussia the movement amounted to 210,958,990 tons, or, say, 15¼ billion ton-miles. Therefore, in America the number of tons moved was, in round numbers, 2¾ times greater and ton-miles were 10½ times greater than in Prussia. The income of American railroads from their freight traffic was 6.44 times as great as the freight income of the Prussian-Hessian railroad system. Roughly speaking, therefore, the American railroads, taken as a whole, had to take care of about as many ton-miles per mile of road as our railroads, while the American passenger traffic, at higher rates, was much lighter in Germany. In both kinds of traffic together America has the additional great advantage that passengers and goods are carried over much greater distances than in Germany. Both these circumstances should tend to facilitate and cheapen the cost of transportation, for it is obvious that a heavy freight traffic is carried more economically in long hauls than in short hauls with considerable branch line movement. The cost of moving freight, including terminal expenses, was naturally lower with the longer distances. Taking this into consideration, we conclude that American railroads, relatively speaking, have by no means to face greater problems than do our railroads. The question is only whether it is possible for them to perform their duties with greater adaptability to the needs of traffic and with greater safety, and whether they can do these things cheaper than our railroads can.

As far as the first two of these demands are concerned—and these are the considerations of highest importance to the public—the claim cannot be made that railroad traffic in the United States is handled more promptly and more safely than it is in Germany. In freight traffic, entirely apart from consideration of discriminations and unfair advantages not as yet eliminated, car shortage not infrequently plays an important part to a much greater extent than in our country whenever traffic increases suddenly and unexpectedly. So long as American railroad management believe in the idea that when their rolling stock is insufficient for temporary requirements they are "working full time," as the expression goes, and that they are "no longer in a position to accept further orders," to quote another industrial phrase, no essential betterment can be looked for. At such times the delays to the whole fabric of train movement are well known, fast passenger train traffic not excepted. As regards safety, the railroads of the United States undoubtedly rank considerably behind those in Germany.

American public opinion has already become aroused on the subject, and yet the real conviction that safety in railroad travel can be kept up only by the most painstaking fidelity to detail has not penetrated the minds of the great masses of American people as it has in our country. It is well known that President Roosevelt has repeatedly recommended measures to do away with the more obvious dangerous practices.

To explain the increased activity and irregularities in service, American railroad officers always speak of the great increases of traffic with which physical improvement of railroads and railroad equipment has not been able to keep pace, while the entire railroad superstructure has been strained by the constant increase in the weight of rolling stock, and employees have been overworked so that they are often in bad physical condition from exhaustion and lack of sleep. We had no chance to ascertain how well founded the complaints were about overworked railroad employees, especially because there seemed to be no fixed rules for duration of the working day and for the length of the rest period. There can be no doubt that American railroad employees as a class make an excellent impression on the visitor, especially on account of their temperate habits. The present-day sobriety of the employees, from the top of the service to the bottom, is surely indispensable to the safe conduct of traffic under such difficulties as have been mentioned. We are disposed to give special credit to the Young Men's Christian Associations for the temperance attitude, and we have recommended the adoption of similar associations in Germany, taking into account the differences in the general practice and circumstances of the two cases. We feel scarcely qualified to pass a final opinion on the general question of the cause of frequent accidents and unpunctuality in the service except to express our belief that these evils are due, in a large measure, to the extraordinarily rapid development of the railroad systems.

In the vast American continent, which until recently never enjoyed even a system of through highways worth mentioning, the railroads, gradually separating northwest and south, have supplied not only the means of handling traffic but have again and again created it. Land did not cost much, even where the state did not give it to the company as a bonus, while considerations of control and public safety were not paramount in the development of the railroad systems. Moreover, the fact that the same language is spoken throughout the length and breadth of this great country

facilitated building up traffic, and this traffic was not hindered by customs barriers, and a uniform system of currency and of credit also assisted materially in the development. Under these conditions the Americans showed foresight and genius in recognizing the fundamental importance of a system of railroads as a means of national development, and they succeeded in pushing the work to such an extent that from the very outset they not merely kept pace with the old world, but went ahead of it. They can fairly claim not alone to have developed themselves out of their own resources, but that they have attracted as well many good things from other countries. The Americans were able to draw on the old world for many models of industrial and economic utility; but in the field of railroading they had to stand on their own initiative. The first American railroad—a portion of the present Baltimore & Ohio system—was opened in the year 1830. Locomotives were introduced on the first British railroad in the fall of the same year, while the first German railroad started running five years later.

The haste with which the American railroad system has been built, often under violent competition by rival companies, clearly explains the reason why American railroad buildings and equipment often failed to comply with the careful workmanship necessary for the safe and efficient handling of traffic. Yet, in spite of these drawbacks there has been one gain from this method of operation, and that is that in spite of, perhaps, or on account of the competitive struggles, the general physical appearance of the roads is much more uniform than it is in Germany. One does not find in America any great difference in the locomotives, passenger cars and freight cars in common use; not only are the types generally the same, but, in considerable detail, there is uniformity of practice apparent. This is a great advantage, not only in facilitating cheap buying but in all interchange of traffic and equipment between roads, enabling through connections to be made readily from ocean to ocean.

We, in Europe, have much to learn in this respect, for the difficulties which confront us in the interchange of traffic between different countries are great, and it is difficult to provide through trains, which can run without change of equipment over the great international traffic routes. Even within the German state railroads the lack of uniformity brings up many curious problems; from the old plan of the car down to the arrangement of the least detail, even to the lock on the door, every German management has its own cherished peculiarities; while the American is always ready to drop inconvenient designs as obsolete, even in exchange for other designs which may, in themselves, be less good, but which have more general use. In Europe, every country and principality adheres most steadfastly to its own peculiarity, sometimes in a way which occasions much annoyance. This, of course, tends to hinder the movement of traffic, and also to increase the cost of buying rolling stock and keeping it in repair. If through the introduction of the American unit designs we could change this state of affairs we could, without envy, give full credit to our American compatriots of the railroad fraternity. It is obvious that we could not adopt American unit designs indiscriminately. For example, the adoption of a standard style of freight car would be hardly practicable with us.

The standard American freight car with four axles does not strike us as suitable for universal adoption; the differences in traffic are too great and we are inclined to think that the very heavy cars often seen have their drawbacks even in American practice. But we must frankly admit that these large cars again and again brought to our attention the fact that our old types of freight cars, having a capacity of five tons or less, are altogether too small, while the object lesson of the large American car has served to bring the two-axle car of Germany up to four times its original capacity, while the introduction of the four-axle car for special kinds of traffic is under consideration.

Europe also must acknowledge that America originated its four-axle passenger car, as well as dining and sleeping cars, even if in the adaptation of these models to local circumstances they have lost much of their identity. It is also well known that the introduction of the center coupling prescribed by law in the United States is being tried in Germany after a plan similar to the American, as well as the use of the air brake on freight equipment, already prescribed by law in the United States.

The American railroads have certainly had to pay dear for experience and are doing so to-day. This is especially true as regards the management of train and yard service and the structures in use. In this respect America is not so far advanced as the old world, and especially is inferior to the German roads and to the Prussian-Hessian roads most of all. America can learn from our practice in these matters the same way as we have learned from America in other fields, and stand ready to learn more. But it looks as if the characteristic American self-esteem would hinder the acquisition of helpful ideas from abroad. The American railroad man seems rather inclined to take it for granted that foreign arrangements are inferior, without so much as looking at them.

Even after definite standards of excellence have been set, the

practical construction of railroad lines as solidly built as ours throughout the greater part of the United States will offer many difficulties to American railroads. Such construction costs money, much money, and yet one must not fear heavy expenses in creating a railroad plan and personnel equal to traffic needs. We refer, in this, to many station buildings and platforms; also particularly to the replacement of numerous wooden bridges by stone and iron structures; to the removal of railroads from grade especially in city streets and to the construction of second track and additional sidings and station facilities.

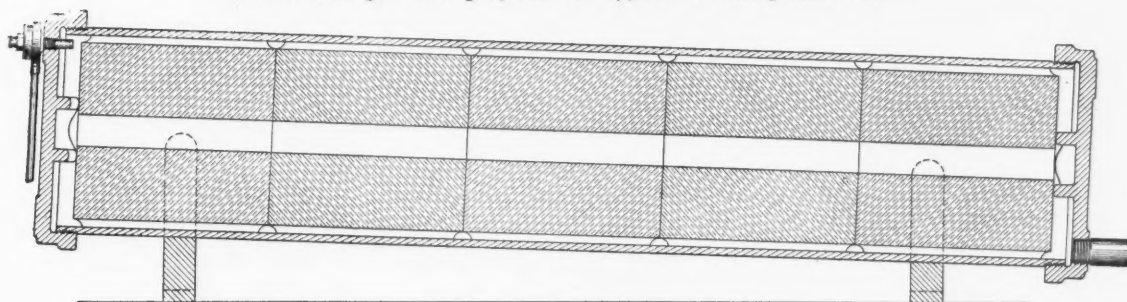
A New Storage System for Heating Refrigerator Cars.

With the large increase in recent years in shipments of perishable freight, particularly fresh fruit and vegetables, during the winter months it has often been difficult for the railroads to provide proper facilities for this traffic. In consequence both railroads and shippers have suffered large losses from damage by freezing, prob-

and end views reproduced herewith. The insides of the cylinders are made of sections of terra cotta brick corrugated on the surface. Steam is taken from the train pipe to the end of the cylinder and at the other end an automatic valve allows the air to escape through the corrugations on the outside of the terra cotta bricks. The steam then circulates freely inside the cylinder. The surplus heat of the cylinder is immediately heated, the bricks absorbing the hot water of condensation, so that the heating of the car and storage of the heat begin at the same time. Bricks having absorbed the hot water will retain for 24 hours enough heat to keep the car warm. To release surplus condensation an automatic trap is fitted to the train pipe about the center of the car. Under this system heat will continue to be furnished after the cars have been cut off from the steam supply, an important factor in the general handling of refrigerator cars in the winter months. A heater is placed under each ice tank where it is out of the way of freight. As the heaters are located in the drip pans, circulation of warm air is produced which maintains a moderate but sufficient and uniform temperature in the car. The



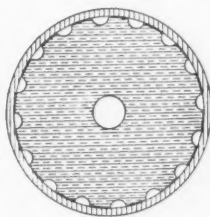
View of Storage Heating System as Applied to Refrigerator Car.



Longitudinal Section of Storage Heater for Refrigerator Cars.

ably as much as several hundred thousand dollars annually. Aside from these direct losses from freezing, the necessity of placing carloads of perishable freight in roundhouses for protection in unusually cold weather has been a source of considerable inconvenience to the roads.

A practical method of heating cars engaged in this service during the winter months has, after three years' trial and development, been worked out by the Gold Car Heating & Lighting Co. The heating is done by two storage heaters in each car, one at each end. The same train pipe, end valves, traps, hose couplers and storage heaters are used as in the company's passenger car heating system. Each storage heater consists of an iron cylinder 12 in. in diameter and about 6 ft. long, as shown by the side



Cross Section of Storage Heater for Refrigerator Cars.

illustration herewith shows the general arrangement of the system. The thermometer shown on the outside of the car is especially adapted to this service, the mercury bulb being inside but the registering plate outside so that the temperature may be read from the outside without opening the doors.

Cars equipped with this system may, while loading, be heated by steam from a stationary boiler or from a switch engine. While running, they can be heated from any locomotive equipped for steam heat.

Simplification of Tariffs.

The Interstate Commerce Commission has drafted a tentative code of rules for the simplification of freight tariffs, and will give a hearing at Washington on October 8 to railroads wishing to suggest changes. The principal rules that the Commission proposes to adopt are:

1. Joint tariffs shall in all cases be filed by the initial line, but an initial carrier may authorize a connecting line to file its

tariffs, provided that all the joint tariffs of such initial line are filed by the same connecting carrier. In this case the connecting carrier shall be treated as the initial line.

2. The schedules of each initial line shall be printed as an independent document and not together with the schedules of any other initial line.

3. Participating lines may file with the Commission a general authority authorizing the initial line to file on their behalf all tariffs or all joint tariffs of a specified kind, and in such case no other concurrence in the tariffs covered thereby will be required. Where such general authority is not on file concurrences must accompany the tariff itself when presented by the initial line for filing, and such tariff will not be accepted and filed until all such concurrences have been received. The Commission will accept as evidence of concurrence a telegram from the proper officer of the concurring line to the proper officer of the filing line, stating the concurrence of the participating line in the tariff. Such concurrence should give the I. C. C. number of the tariff concurred in.

4. Class rates shall be filed in a tariff by themselves, and commodity rates in one or more tariffs, as the carriers may elect.

5. Each carrier shall file an index showing all commodity rates in effect which have been filed by it, specifying the I. C. C. number of the tariff in which such rate is found. Such index shall be by commodities and shall be made in such detail that each commodity can be easily located. This index shall be reprinted and filed with the Commission every three months, beginning January 1, 1907, provided changes have been made in the meantime; or carriers may file an index consisting of detachable leaves and may print the necessary leaf whenever change is made.

6. Not over five supplements shall be promulgated to any tariff, and not over ten to any classification; to show changes beyond this number the entire tariff or classification shall be reprinted. Each supplement, whether to a classification or a tariff, shall indicate all changes made by that supplement and previous supplements from the original tariff.

7. In the compilation of tariffs a uniform order shall be observed so that a given subject will always be found in a given portion of the tariff. Any fact stated in any other portion of the tariff than that prescribed will be regarded as not mentioned at all.

8. Terminal charges, which must be paid by all shippers at destination, and which are, therefore, really a part of the cost of transportation, must be specified in the tariff of the initial line. Terminal charges which depend upon a contingency, like demurrage, storage, switching, etc., shall be filed by the delivering line and posted in the delivering station.

When any switching or terminal charge either at the point of origin or the point of delivery, is absorbed, or when any service is rendered and the total cost to the shipper from the place where the property is first received to the place where it is finally delivered, is thereby affected, such absorption or such service shall be stated upon the tariff.

After sufficient time has been allowed carriers for the revision of their tariffs no schedule will be filed by the Commission which is not constructed in conformity with the requirements of the statute and the rules prescribed by the Commission, and which does not so state the rates contained that they can be understood by a person of ordinary intelligence.

Railroad Statistics of the United States for Year Ending June 30, 1905.

The Interstate Commerce Commission has issued an advance abstract of its annual report for the year which ended 15 months ago, from which the principal items are shown below. The preliminary report for the year under review was given in the *Railroad Gazette* December 22, 1905, page 590.

Railroad Statistics for Years Ending June 30.

	1905.	1904.	1903.	1902.	1901.
Miles complete	218,101	213,904	207,977	202,472	197,237
Increase, 12 mos.	4,197	5,927	5,505	5,234	3,892
In hands receivers	796	1,323	1,185	1,475	2,497
Locomotives, No.	48,357	46,743	43,871	41,228	39,584
Cars owned, pass.gr.	40,713	39,752	38,140	36,991	35,969
Cars owned, freight	1,731,409	1,692,194	1,653,782	1,546,132	1,464,328
Cars owned, total	1,842,871	1,798,561	1,753,389	1,640,220	1,550,833
Employees	1,382,196	1,296,121	1,312,537	1,189,315	1,071,169
Per 100 mls road	637	611	639	594	548
Total stock and funded debt, millions	\$13,805.3	\$13,213.1	\$12,600.0	\$12,134.2	\$11,688.2
Stock and debt per mile of road	\$65,926.0	\$64,265.0	\$63,186.0	\$62,301.0	\$61,528.0
Gross earnings, millions	2,082.5	1,975.1	1,900.1	1,726.4	1,588.5
Average per mile	9,598.0	9,306.0	9,258.0	8,625.0	8,123.0
Passengers:					
Carried, millions	738.8	715.4	694.9	649.9	607.3
1 mile, millions	23,800.1	21,923.2	20,915.8	19,690.0	17,353.6
Freight:					
Carried, millions	1,427.7	1,309.9	1,304.4	1,200.3	1,089.2
1 mile, millions	186,463.1	174,522.1	173,221.3	157,289.4	147,077.1
Average rate per ton, mile, mls.	7.7	7.8	7.6	7.6	7.5
Average pass. fare per mile, cts.	2.0	2.0	2.0	2.0	2.0

Examining the totals for 1905 more in detail the following items will be found of interest:

An increase in mileage of railroad exceeding 100 miles appears for Alabama, Arkansas, California, Georgia, Illinois, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nevada, North Carolina, Pennsylvania, Texas, West Virginia, Wisconsin and Indian Territory.

The operated mileage for which returns were made was 216,973.61 miles, including 7,568.95 miles of line used under trackage rights. This is the total on which the averages of earnings and service are based. The aggregate length of track was 306,796.74 miles, including second track, 17,056.30 miles; third track, 1,609.63 miles; fourth track, 1,215.53 miles, and yard track and sidings, 69,941.67 miles. Yard track and sidings increased 35½ per cent.

The number of corporations reporting was 2,167, of which 1,169 were operating roads. During the year companies owning 3,802 miles of line were reorganized, merged, or consolidated. The corresponding figure for the year 1904 was 5,600 miles. The number of roads in the hands of receivers was 26. The locomotives, excepting 947, were classified as: Passenger, 11,618; freight, 27,869, and switching, 7,923; average number of locomotives per 1,000 miles of line, 223; average cars per 1,000 miles, 8,494. Average ton-miles per freight locomotive, 6,690,700, an increase of 233,854. The report shows the type and tractive power of locomotives and the capacity of freight cars by classes.

Of the capital there existed as stock \$6,554,557,051, of which \$5,180,933,907 was common, and \$1,373,623,144 preferred; funded debt, \$7,250,701,070, consisting of mortgage bonds, \$6,024,449,023; miscellaneous obligations, \$786,241,442; income bonds, \$253,707,699; and equipment trust obligations, \$186,302,906.

Dividends declared during the year, \$237,964,482, equivalent to 5.78 per cent. on dividend-paying stock. For the year ending June 30, 1904, the amount of dividends declared was \$221,941,049.

Of the total amount of railroad stock outstanding \$2,070,052,108 was owned by railroad corporations, and of railroad bonds, \$568,100,021.

The average revenue per passenger per mile, when carried out to three decimal, 1.962 cents. For the preceding year it was 2.006 cents. The ratio of operating expenses to earnings for the year was 66.78 per cent. For 1904 this ratio was 67.79 per cent.

Gross earnings, \$2,082,482,406, were \$107,308,315 greater than for the year 1904, and for the first time exceed the two billion mark. Operating expenses were \$1,390,602,152, or \$51,705,899 more than in 1904. The gross earnings in detail were: Passenger revenue, \$472,694,732—increase, \$28,367,741; mail, \$45,426,125—increase, \$926,393; express, \$45,149,155—increase, \$3,273,519; other earnings from passenger service, \$11,040,142—increase, \$125,396; freight revenue, \$1,450,772,838—increase, \$71,770,145; other earnings from freight service, \$5,080,266—increase, \$511,984; other earnings from operation, \$52,319,148—increase, \$2,333,137.

The operating expenses assigned to the four general classes were: For maintenance of way and structures, \$275,046,036; maintenance of equipment, \$288,441,273; conducting transportation, \$771,228,666; general expenses, \$55,319,805; undistributed, \$566,372. Operating expenses averaged \$6,409 per mile of line, this average showing an increase of \$101 per mile in comparison with the year 1904.

Total income from operation (net earnings) was \$691,880,254; per mile of line, \$3,189. The amount of income attributable to other sources than operation was \$231,898,553, as follows: Income from lease of road, \$114,473,139; dividends on stocks owned, \$56,842,694; interest on bonds owned, \$18,786,644, and miscellaneous income, \$41,796,076. The total income (\$923,778,807)—that is, the net earnings and income from lease, investments, and miscellaneous sources—is the amount from which fixed and other charges against income are taken to ascertain the sum available for dividends. Such deductions aggregated \$596,688,420, thus leaving \$327,090,387 as the net income for the year ending June 30, 1905, available for dividends or surplus.

The amount of dividends declared during the year under review (including \$82,415 representing other earnings to stockholders) was \$238,046,897, leaving as the surplus from the operations of the year ending June 30, 1905, \$89,043,490. The figures for income and expenditures are compiled from the annual reports of leased roads as well as of operating roads, and thus, necessarily, include duplications in certain items.

The report shows the total taxes and assessments of the railroads by States and Territories and has an analysis showing the basis of assessment.

The total number of casualties to persons was 95,711, of which 9,703 were killed and 86,008 injured. These figures include the casualties to persons trespassing, of whom 4,865 were killed and 5,251 were injured. The total number of casualties to persons other than employees from being struck by trains, locomotives, or cars, was 4,569 killed and 4,163 injured. The casualties to passengers and employees have been reported in the quarterly bulletin.



GENERAL NEWS SECTION

NOTES.

The Buffalo, Rochester & Pittsburg announces that beginning November 1 local passenger rates will be reduced to 2½ cents a mile.

In the United States District Court at Philadelphia, September 25, the Camden Iron Works was found guilty of receiving rebates from the Mutual Transit Company, a lake line.

A press despatch from Chicago says that the Illinois Central has decided to take radical ground in the matter of freight car scarcity, and will refuse to allow its cars to go on to other roads.

On the Gulf, Colorado & Santa Fe, in Texas, an order has been issued that firemen to be examined for promotion to the position of enginemen must not merely have been in the service three years, but must actually have worked 900 days.

The passenger men of Minneapolis having some time ago secured injunctions which resulted in putting the ticket brokers out of business, now find that "a clerk in every hotel" is supplied with cut rate tickets for sale to traveling men.

St. Paul papers report that the Northern Pacific has made reductions of 10 per cent, and in some cases more, in the rates on coal from Duluth; and that the Great Northern and other roads in the state will have to make similar reductions.

Half a dozen of the principal roads centering in Chicago have secured from the United States Circuit Court a permanent injunction against the unauthorized sale of tickets, which it is believed will close up the scalpers' offices in that city.

Beginning October 10 the Southern Pacific will considerably reduce the rates on freight carried in iced refrigerator cars. Hitherto the rates on commodities in such cars were 25 per cent. higher than for the same in common cars; this will be taken off.

On the Pittsburg, Cincinnati, Chicago & St. Louis two freight cabooses on each division are to be equipped with compressed air whistles, to enable a flagman to signal to the engineman when he has returned to his train, and also to enable a stop signal to be given at any time.

At a hearing in Chicago last week the lumber carrying railroads which had been complained of for charging transportation on the stakes and ties used to secure lumber on flat cars, promised the Interstate Commerce Commission that henceforth they would allow 500 lbs. of such material free on each car.

On September 24 a steamboat arrived in Kansas City from St. Louis with a load of freight, the first to come up the Missouri river for more than ten years. The boat was welcomed by whistles and bells; but how much weight should be given to the accompanying statement that regular traffic is to be resumed does not appear.

The suits filed by the state of Texas against certain railroads and express companies for violation of the law, in making exclusive contracts for conducting the express business, have been compromised. The aggregate possible penalties were \$6,000,000. The amount paid is \$40,000, of which, it is said, the lawyers will get \$8,000.

It is announced in Chicago that the round-trip rate over the Illinois Central to New Orleans for the Knights of Pythias will be 80 per cent. of the one-way fare, which is equal to about one cent a mile. This is said to be the lowest rate that has ever been granted for an occasion of this kind, except for the Grand Army of the Republic.

The Attorney-General of Ohio, at the request of the State Railroad Commission, has rendered an opinion holding that Section 3,227 of the Revised Statutes does not prohibit railroads from charging demurrage on freight cars until a period of 10 days has expired. It appears that the prohibition in question applies only to freight in less than car load lots.

At a hearing given by the Interstate Commerce Commission at Omaha, September 19, a representative of coal mines near Rock Springs, Wyo., testified that he was unable to build a track to the Union Pacific because the officers of the Union Pacific Coal Company blocked his plans. The owner of a mine near Hanna, Wyo., made similar statements.

The President of the Boston & Maine has notified stockholders that in consequence of the stringent provisions of the Interstate Commerce law, as revised, stockholders will no longer be carried free to the annual meetings of the company. The Boston & Albany, a large majority of whose stockholders live in Massachusetts, makes no change in its time-honored policy of carrying stockholders and

their proxies—especially feminine proxies—free on its annual September Boston shopping excursion.

In the United States Court at Frankfort, Ky., September 24, Judge Cochran granted a temporary injunction restraining the State Railroad Commission from enforcing an order which it has made reducing freight rates throughout the state 20 per cent. The railroads are required to keep full records of all shipments so that in case the suit goes against them they can promptly refund overcharges to shippers.

The Interstate Commerce Commission having received numerous requests for extension of the time within which annual reports must be filed (now September 30 by statute, with fine of \$100 a day for delay, instead of September 15, as formerly required by a rule of the commission) has issued a general notice that, in the opinion of the commission the necessity must be very rare which will justify it in granting an extension of time.

That portion of the New York Central main line between Spuyten Duyvil and Mott Haven Junction, a part of which (between High Bridge and Mott Haven) is being electrified, has already been rearranged so that trains run on the right-hand track, instead of the left-hand as in the past. In consequence of this change, northbound trains and southbound trains will cross each others paths at Mott Haven Junction instead of Spuyten Duyvil. New overhead stations have just been put in use at High Bridge and Morris Heights on this line. The use of electric motors on passenger trains is still a month or more in the future.

The Long Island Railroad Company announces that in making flat rates for season tickets, which is to be done after this month, the company will lose \$49,000 yearly, unless there is an increase in traffic. Hitherto the rate between Long Island City and Far Rockaway, for example, has been \$11 a month for the first month in a year and \$5 for the last month; now the rate will be \$7.50 for each and every month in the year. The prospective loss appears to be due to the fact that large numbers of passengers begin their year in the summer, buying tickets at the highest rate, but do not continue through the year, moving back to the city in the winter.

According to the *Altoona Times* the scarcity of telegraph operators on the Pennsylvania Railroad has become so acute that the company proposes to establish on the Pittsburg division an operators' apprentice system; and the question arises whether or not this will precipitate trouble with the Telegraphers' Brotherhood, which has induced or compelled many railroads to forbid the presence of students in their offices. The Pennsylvania proposes to employ young men from 17 to 21 years of age as lever men in interlocking towers. They are to work under the direction of the signalman (who is a telegraph operator) and will be expected in their spare time to learn telegraphy.

Philadelphia papers report that the hourly express trains running between that city and New York over the Reading and the Central of New Jersey are soon to be all two-hour trains. These trains leave each terminus "on the hour" from 7 a.m. to 6 p.m. At present six eastbound and seven westbound run through in two hours. The others make more stops. It is said that additional trains will be put on to accommodate intermediate cities. It is said that all of these fast trains will run over the cut-off, a few miles east of Philadelphia, which shortens the distance 2.1 miles. With the cut-off this line has four tracks all the way, except between Yardley and Bound Brook.

The Erie Railroad employees' magazine reports the following cases of commendation of employees for special merit: Engineman H. W. Smith, who discovered a malicious obstruction on the track; Brakemen H. M. Shock and R. I. Friel, for discovering cracked wheels; Freight Conductor J. H. Troy for specially good work when off duty; Engineman V. B. Tuthill, for stopping a derailed car and thereby preventing damage; Operator Jerry Dee, quick signaling of a train, preventing it from striking an accidental obstruction at a highway crossing; Foreman J. S. Thompson, for discovering a broken switch and promptly safeguarding trains; Operator A. M. Vicker, for discovering a broken flange as it was passing his tower; Engineman D. A. Roschie, for the quick renewal of a defective air hose; Foreman Painter Frank Benberger, for discovering a semaphore bracket which was too near the track, and Brakeman William Ryan, for discovering a spike fastened in a switch.

Car Head Linings and Roofs.

In the new steel cars built for electric service on the New York Central, as well as in some other fireproof cars, a new material made from wood pulp is being used for head linings and also for roofs. It is called indestructible fibre and it has several advantages: It is a non-conductor, it is flexible so as to be easily bent to the

required curves, it is probably stronger than any available wood, and it is easily made fireproof by mixtures in the pulp. When fine shavings are whittled from it and a hot flame is applied to it, it is converted into charcoal; but it does not blaze and the fire goes out as soon as the flame is taken away from it. This artificial wood also has the advantage over natural wood in that it does not splinter, has no knots and is homogeneous throughout. It is also a good vehicle for holding paint, and when covered with porcelain paint it becomes an inexpensive and efficient substitute for tile for walls or floors. Inventions of this kind also appeal to us as being for the general welfare in that they economize the use of timber and so benefit the world. This material is made by the Indestructible Fibre Co., 45 Broadway, New York City.

Holding Power of Spikes.

The Government Forest Service has made some tests to determine the holding power of different forms of railroad spikes. The spikes used were common driven spikes, a driven spike which has about the same form as the common spike with a lengthwise channel on the side away from the rail, and screw spikes. The common and the channeled spikes were driven into the ties in the usual manner to a depth of 5 in. A hole of the same diameter as the spike at the base of the thread was bored for the screw spikes, which were then screwed down to the same depth as the driven spikes. The ties were then placed in the testing machine and the force required to pull each spike was recorded.

The average force required to pull common spikes varies from 7,000 lbs. in white oak to 3,600 lbs. in loblolly pine, and 3,000 lbs. in chestnut. The holding power of the channeled spike is somewhat greater, about 11 per cent. with loblolly pine. The screw spikes range from 13,000 lbs. in white oak to 9,400 lbs. in chestnut and 7,700 lbs. in loblolly pine.

There is a marked difference between the behavior of driven and screwed spikes in knots and in clear wood. Knots are brittle and lack elasticity, so driven spikes do not hold as well in them as in clear wood. In the case of common spikes in loblolly pine the decrease of holding power in knots is as great as 25 per cent. On the other hand, screw spikes tend to pull out the whole knot which they penetrate. This increases the resistance so much that in loblolly pine the increase of holding power of screw spikes in knots is about 35 per cent. over that for clear wood.

Electrical Equipment for the Hudson Company's Tunnels.

The electrification of the completed twin tunnels of the Hudson & Manhattan Railway (Hudson Companies) under the North river connecting Jersey City with New York, will be begun at once. Each tunnel is single track; the north tube for the westbound and the south tube for the east bound or New York traffic. Cars will be operated in trains by the third rail system using the Sprague-General Electric system of multiple unit control—the system used in the New York subway. Each of the 50 cars will be equipped with two 160-h.p. railroad motors. Power will be supplied from a large turbine power station to be located between Jersey City and Newark. The General Electric Company will furnish the complete electrical equipment. It is expected that when the new line is in operation the running time between nearby points in New Jersey and New York City will be reduced one-half.

Disastrous Train Wreck at Grantham, England.

On the night of September 19 a fast night express of the Great Northern Railway of England, bound from London to Edinburgh, was derailed at Grantham, while running at high speed through a curve, and at least 8 passengers were killed; 16 or more were injured. The engineman and fireman were both killed. It is said that the train should have stopped at Grantham, and also that all trains are required to limit speed to 10 miles an hour through the curve where the derailment occurred. The officers of the road have found no evidence of failure of the brakes, and there is no explanation of why the speed of the train was not slackened.

Sunday Rest on Railroads in France.

A press despatch from Paris says that the leading six railroad companies of France have informed the Minister of Public Works that, although railroads are specifically exempted from the new Sunday Rest law, all employees of the roads will be granted 52 days off in a year. The number of persons employed by these railroads is 280,000, and the plan is to be put in effect within 18 months. The railroads say that they cannot lay off all of the men on Sunday, but will give the holidays to the different men in rotation.

Mr. Acworth on the Rate Bill.

Mr. W. M. Acworth, of London, is quoted as follows on the new rate bill:

"You have passed a new law; and now—so I gather from the newspapers—the millennium is at the door. All rates in future are going to be reasonable and just—in everybody's opinion. City A is to get lower rates, and City B, which heretofore was at an advantage, will in future be on an equality with A. And the citizens

of B are hymning the millennium. I fear they will sing out of tune once the commission gets to work.

"This is assuming that the commission really does make active use of its new powers and that it is supported in so doing by the courts. For my own part I have too much respect for the commission to expect that it will do anything radical in the rate regulation line, at any rate, for some time to come. We don't know for certain and never shall know what is a just and reasonable rate.

"If we want to get a rough idea of what it ought to be, our best chance is to look at the railroad schedule and see what the actual rate is. For the actual rate has not been made by the arbitrary decision of any single man, but by the free play of complex economic forces acting over a long series of years.

"Our English Parliament started regulating railway rates sixty years ago and has passed rate regulation bills at intervals of about ten years ever since. The last was in 1893, so another is about due. Probably it will come in a year or two, and when it does come, like its predecessors, it will not make much difference to anybody.

"No honest man can do otherwise than sympathize with any attempt to catch, fine and imprison the dishonest people who have extorted rebates, and even the complaisant railway men who grant them. But, so far as I can learn, the days of secret rebates were practically over some time before your new act was passed."

How to Treat Purchasers of Tickets.

The engravings shown herewith are made from photographs which appeared recently in the *North-Western Bulletin*, the periodical published in the interest of the employees of the Chicago & North-Western, having been sent to the *Bulletin* by Mr. J. R. Hood, agent of the company at Oakdale, Neb. The first picture represents a ticket agent before he has learned to treat passengers with thoughtful consideration. He has thrown the lady's ticket and



change down on the counter, where they have to be laboriously recovered by her; and as she has on a pair of new gloves this takes some little time, and in many cases causes more or less annoyance. How it is that in this particular case the lady wears such an unruffled expression we do not pretend to be able to explain. The second picture represents the same agent after he has been reformed. He puts the ticket and coins into the customer's extended palm. It is safe to say that both lady and ticket agent live happy ever after.

Dynamite Disaster at Jellico, Tenn.

By an explosion of dynamite in a freight car of the Louisville & Nashville Railroad, standing on a side track at Jellico, Tenn., about 8 o'clock on the morning of September 21, eight or more persons were killed and 50 seriously injured; and a thousand people were rendered homeless. The despatches say that all of the business houses of the town were destroyed, and that the property loss will exceed a million dollars. One report says that the explosion was caused by bullets, which were fired at a target fastened to the car, while another says that in switching, a carload of iron bumped violently against the car containing the explosive.

Status of Work on New York Canal Enlargement.

The total amount of contract work for which plans and specifications have been prepared by the State Engineers' Department, and passed on and approved by the advisory board of Consulting Engineers up to September 1, 1906, on the Erie, Champlain and Oswego canals, is reported at \$22,644,418. Twelve contracts have been let, on which work is now under way, as follows: Erie Canal system, seven contracts, aggregating \$5,866,285; Champlain Canal system, three contracts, \$2,825,347, and the Oswego Canal system, one contract for \$1,126,718. In addition a contract has been let for work common to both the Erie and Champlain canals, amounting to \$97,635. No bids were received for contract No. 12, Erie Canal, the engineers' estimate for which was \$1,329,635, and it is probable that conditions affecting this contract will have to be modified before it is again advertised.

The Canal Board has plans and specifications for six additional

contracts, which are now ready for advertising, the engineers' estimate under these contracts aggregating \$11,245,273, and the State Engineers' Department has almost finished plans and specifications for twelve other contracts on the three canal systems. It is expected that this will be let before the close of 1906.

Should this prove practicable more than one-third of the entire work of construction of the three canals would be let by January 1, 1907. The work actually contracted for and now under way has been let at prices averaging 10 per cent. less than the original estimates and appropriations made under the barge canal act of 1903.

A Cripples' Labor Union.

The "one armed men's" union was founded last night in a hall at Fifty-fifth street and Wentworth avenue. Its principles essentially are humanitarian, it being devised with special regard for the 1,200 maimed, legless, or armless switchtenders, flagmen and crossing men employed by the railroads in and near Chicago.

One of the first things on the programme of the new union will be to secure a more "comfortable" existence for the disabled members. The list of demands to be filed with the railroad companies embraces "cushioned seats" for members with "stumps," ice-water in summer time, and awning shades to protect the tenders from the heat of the sun and the dampness.—*Chicago Tribune.*

TRADE CATALOGUES.

Trussed Concrete Bulletin.—The September number of this publication of the Trussed Concrete Steel Co., Detroit, Mich., is called an automobile number. The name, however, has reference to automobile factory construction rather than to the machines themselves. The construction of reinforced concrete additions to the plant of the Packard Motor Car Co., Detroit, is described and illustrated, and mention made of other automobile factory buildings of reinforced concrete construction according to the Kahn system, aggregating 25 acres of floor space. A view is also shown of the new reinforced concrete warehouse of the Oliver Chilled Plow Co., South Bend, Ind., in process of construction.

Lathes.—The Gisholt Machine Co., Madison, Wis., has just issued page 58 of its loose leaf binder. It illustrates and describes a 34-in. Gisholt turret lathe which was recently furnished to one of the large railroad shops for finishing cross heads, eccentrics, piston centers and piston rims. Illustrations of the work done are also shown.

Pig Iron Production.—Pilling & Crane, Pittsburg, Pa., send a "crystaloid" sign, 8 x 10, exhibiting by diagrams the production of pig iron in the United States in long tons by decades from 1830 to 1905, and the per capita production in pounds for a similar period.

Manufacturing and Business.

G. S. Baxter & Company, of Jacksonville, Fla., have contracted to furnish 100,000 ties for the Panama Railroad.

The Barker Mail Crane Co., Clinton, Iowa, reports good business thus far for 1906, the sales of cranes and orders on hand being most satisfactory. These cranes are now in use on 26 railroads.

William M. Brodie, who for the past six years has been connected with the manufacturing department of the Edison Mfg. Co., Orange, N. J., has been appointed manager of sales of the company.

The Walter A. Zelnicker Supply Co., St. Louis, Mo., has bought the two Holland interurban parlor and sleeping cars "Theodore" and "Francis," formerly operated out of Zanesville, Ohio. They were the first cars of this character built and cost \$28,000 each. Each car is equipped with 600 h.p. motors. They were only used about three months. This company also bought all of the equipment for the cars and the Holland patents for the United States and Canada.

Iron and Steel.

The Erie has ordered 38,000 tons of rails and the Panama Railroad has ordered 5,000 tons.

The American Bridge Co., in addition to the 700 tons of steel for a San Francisco building, has received an order for 4,500 tons.

J. G. White & Co. have so far ordered 104,000 tons of rails and structural steel to be sent to Manila for use on the railroads which this company is building in the Philippine Islands.

The Western Pacific has ordered from the American Bridge Company the steel required for 15 bridges. There is to be a long steel bridge at Sacramento, but most of the other bridges on the line are not of great length.

The Harriman lines, which recently let a contract for 20,000 tons of structural steel, are in the market for 14,000 tons of steel billets to be made into tie plates; but owing to the congested condition of the billet mills it is doubtful if any mill can be found to take the order.

The New York Central Lines have closed negotiations for 80,000 tons of rails for 1907 delivery, to be used as follows: Lake Shore, 32,000; C., C., C. & St. L., 31,000; Michigan Central, 12,000; Cincinnati Northern, 2,000, and Lake Erie & Western, 3,000. The order is for only about one-half the quantity needed by the Central Lines, and other contracts will be let later for another 80,000.

Eastern and central traction lines have given additional orders to rail mills for an aggregate of 15,000 tons of standard steel sections for delivery next year, and numerous steam and trolley lines issued new inquiries for fully 50,000 tons more for shipment during the first half of next year. The total tonnage for 1907 now before the mills in all sections of the country aggregates at least 500,000 tons, and it is expected that all of these contracts and many more will be awarded before the end of this year.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Maintenance of Way Master Painters' Association.

The Secretary announces that the next meeting of this association will be held in New York, November 13 and 14, 1906.

Western Society of Engineers (Chicago).

The following is a tentative program of the meetings of this society for the balance of this year, with the papers to be presented:

October 3, "Methods for the Testing of Coal," by A. Bement.
October 17, "Smoke Prevention and Suppression," by A. Bement.
November 7, "Notes on Road Resistance," by C. H. Hudson.
November 21, "Waterproofing, Particularly as Applicable to Masonry and Concrete Structures," by Edward W. DeKnight.
December 5, "Concrete Pipe Culverts," by O. P. Chamberlain.
December 19, "Gravity Switching Yards for Freight Traffic," by M. H. North.

The annual meeting and annual dinner will take place Jan. 8, 1907.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Atlantic Coast Line.—Alexander Hamilton has been elected General Counsel, succeeding W. G. Elliott, deceased.

Chihuahua & Pacific.—B. F. Maurer, Auditor, Freight and Passenger Agent, has resigned to become Manager of the Central of Peru.

Colorado Southern, New Orleans & Pacific.—A. M. Hood, formerly Auditor of the Tennessee Central, has been appointed Auditor of the Colorado Southern, New Orleans & Pacific, with office at Beaumont, Texas.

New York, New Haven & Hartford.—The number of directors has been reduced from 21 to 19, the retiring members being Percy R. Tood, First Vice-President, and Richard McCurdy, of New York.

Seaboard Air Line.—A. L. Nutt, Assistant Secretary and Assistant Treasurer, has been appointed Treasurer.

Texas & Gulf.—F. T. Rembert has been elected Secretary and Treasurer, succeeding G. A. Rogers, resigned.

Texas Southern.—C. L. Taylor has been appointed Receiver of this company, succeeding S. P. Jones, effective October 1st.

Operating Officers.

Southern.—A. H. Westfall, General Superintendent of the Elgin, Joliet & Eastern, has been appointed Superintendent of the Southern, with office at Atlanta, Ga.

Elgin, Joliet & Eastern.—See Southern.

Traffic Officers.

Chicago, St. Paul, Minnesota & Omaha.—E. B. Ober, formerly First Assistant General Freight Agent, has been appointed General Freight Agent, with office at St. Paul, Minn., succeeding H. M. Pearce.

Missouri, Kansas & Texas.—Thomas Noel, Assistant General Freight Agent at Houston, Tex., has resigned, effective October 1st, to go into other business.

San Pedro, Los Angeles & Salt Lake.—E. W. Gillett, General Freight and Passenger Agent, has resigned.

Engineering and Rolling Stock Officers.

Atchison, Topeka & Santa Fe Coast Lines.—H. C. Phillips has been appointed Chief Engineer, with office at Los Angeles, Cal., succeeding C. A. Morse.

Isthmian Canal Commission.—Joseph Ripley, who was recently appointed Principal Assistant Engineer, was born in Michigan in 1854, and graduated from the Michigan University in 1876. After leaving college, he worked as a land surveyor for a year, and then went into government work, acting as Assistant Engineer of the St. Mary River Improvements from 1879 to 1906. He has also been in charge of other work during this period as follows: In 1897 he was in charge of surveys, plans and estimates of the canal from Birmingham, Ala., to the Warrior river, and from 1898 to date he was General Superintendent of the St. Mary's Falls Canal. For the past year Mr.



Joseph Ripley.

Ripley has been a member of the Consulting Board of Engineers for the Panama Canal.

Wisconsin Central.—J. Krey, formerly Division Engineer of the Duluth, Missabe & Northern, has been appointed Division Engineer of the Duluth-Superior district of the Wisconsin Central, with office at Duluth, Minn.

LOCOMOTIVE BUILDING.

The Toledo Railway & Terminal Co. would like to lease one or two locomotives for a few months.

The Louisville & Nashville, it is reported, has ordered 25 locomotives from the Baldwin Locomotive Works.

The Canadian Pacific, it is reported, has ordered 50 consolidation (2-8-0) locomotives from the Locomotive & Machine Co., Longue Pointe, Que.

The Philippine Railways Company has ordered four Mogul (2-6-0) locomotives from the Baldwin Locomotive Works. Address, care of J. G. White & Co., New York.

The Queen & Crescent Route has ordered four simple 10-wheel (4-6-0) locomotives for the Alabama & Vicksburg, and two simple 10-wheel (4-6-0) locomotives for the New Orleans & Northeastern from the Baldwin Locomotive Works, for January and February, 1907, delivery. The specifications are as follows:

General Dimensions.		Ten-wheel
Type of locomotive	Consolidation.	Eight wheel
Weight, total	204,000 lbs.	136,000 lbs.
Weight, on drivers	180,000 lbs.	88,000 lbs.
Diameter of drivers	57 in.	69 in.
Cylinders	22 in. x 30 in.	19 in. x 26 in.
Boiler, type	200 lbs.	180 lbs.
Working steam pressure		
Number of tubes		
Diameter of tubes		
Length of tubes		
Firebox, length		
Width		
Grate area		
Heating surface, total		
Tank capacity		
Coal capacity		
Special Equipment.		
Air brakes	Westinghouse	
Brake-beams	Monarch	
Couplers	Tower	
Headlights	Pyle-National	
Injectors	Monitor	
Piston rod packing	U. S. Metallic	
Valve rod packing	Garlock	
Safety valve	Coale and Consolidated	
Sanding devices	Leach	
Sight-feed lubricators	Nathan	
Steam gages	Ashcroft or Star	
Steam heat equipment	Safety	

The Colorado Southern, New Orleans & Pacific has ordered 26

simple consolidation (2-8-0) locomotives from the Baldwin Locomotive Works, for January and February, 1907, delivery; six simple eight-wheel passenger (4-4-0) locomotives, two simple 10-wheel passenger (4-6-0) locomotives, and four simple six-wheel (0-6-0) switching locomotives from the American Locomotive Co., all for January to April, 1907, delivery. The specifications are as follows:

General Dimensions.		Eight wheel
Type of locomotive	Consolidation.	136,000 lbs.
Weight, total	204,000 lbs.	88,000 lbs.
Weight, on drivers	180,000 lbs.	69 in.
Diameter of drivers	57 in.	19 in. x 26 in.
Cylinders	22 in. x 30 in.	180 lbs.
Working steam pressure	200 lbs.	
Type of locomotive	Ten-wheel.	Switching.
Weight, total	182,000 lbs.	121,000 lbs.*
Weight, on drivers	135,000 lbs.	
Diameter of drivers	69 in.	
Cylinders	21 in. x 26 in.	19 in. x 26 in.†
Working steam pressure	200 lbs.	180 lbs.

*Three locomotives, 121,000 lbs.; one locomotive, 148,000 lbs.

†Three locomotives, 19 in. x 26 in.; one locomotive, 20 1/2 in. x 26 in.

The Seaboard Air Line has ordered five simple passenger locomotives from the Baldwin Locomotive Works. The specifications are as follows:

General Dimensions.		
Weight, total, engine and tender	269,000 lbs.	
Weight, on drivers	132,610 lbs.	
Diameter of drivers	67 in.	
Dimensions of cylinders	20 in. x 28 in.	
Boiler, type	Wagon top	
Working steam pressure	200 lbs.	
Number of tubes	328	
Diameter of tubes	2 in.	
Length of tubes	14 ft. 1 1/2 in.	
Firebox, length	9 ft.	
Width	42 in.	
Grate area	31 sq. ft.	
Heating surface, total	2,644 sq. ft.	
Tank capacity	5,000 gals.	
Special Equipment.		
Air brakes	Westinghouse	
Brake-beams	Monarch	
Couplers	Tower	
Headlights	Pyle-National	
Injectors	Monitor	
Piston rod packing	U. S. Metallic	
Valve rod packing	Garlock	
Safety valve	Coale and Consolidated	
Sanding devices	Leach	
Sight-feed lubricators	Nathan	
Steam gages	Ashcroft or Star	
Steam heat equipment	Safety	

CAR BUILDING.

The Grand Trunk has asked prices on several classes of car equipment.

The Cleveland, Cincinnati, Chicago & St. Louis has ordered 25 cabooses from the American Car & Foundry Co.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 25 cabooses from the American Car & Foundry Co.

The Central of New Jersey has increased its order with the Standard Steel Car Co. from 1,000 to 2,000 box cars.

The Delaware & Hudson has ordered from the American Car & Foundry Co. 400 flat cars, 100 produce cars, 20 refrigerator cars and 100 stock cars.

The Chicago, Milwaukee & St. Paul has asked for space with the car builders for about 40 passenger equipment cars, including 25 coaches in the lot.

The Philippine Railways Company has ordered 50 dump cars from the Continental Car & Equipment Company. Address, care of J. G. White & Co., New York.

The Chicago, Lake Shore & Eastern has ordered from the American Car & Foundry Co. for the Elgin, Joliet & Eastern 225 side dump cars, 300 steel underframe gondolas and 150 steel underframe side dump gondolas.

The Georgia Coast & Piedmont has ordered from the American Car & Foundry Co. twenty 34-ft. box cars of 60,000 lbs. capacity, and 100 36-ft. flat cars of 60,000 lbs. capacity. The bodies and underframes of all cars will be of wood.

The St. Louis & San Francisco has ordered for the Colorado Southern, New Orleans & Texas Pacific 500 steel underframe 40-ft. box cars, 250 steel underframe flat cars and 75 tank cars from the American Car & Foundry Co., for March to May, 1907, delivery.

The Marquette & Southeastern has ordered 100 steel ore cars of 100,000 lbs. capacity from the Pressed Steel Car Co., for April, 1907, delivery. These cars will weigh 33,000 lbs. and measure 22 ft. long, 8 ft. 6 in. wide and 9 ft. 9 in. high, over all. The special equipment includes:

Brakes	Westinghouse
Draft rigging	Westinghouse

The New York Central Lines have ordered 4,000 box cars from the Pullman Co.; 2,000 box cars, 3,000 coal cars and 2,050 flat cars from the American Car & Foundry Co.; 4,350 coal

cars from the Standard Steel Car Co., 1,000 steel coal cars from the Barney & Smith Car Co., and 650 ballast cars from the Rodger Ballast Car Co.

The Colorado Southern, New Orleans & Pacific has ordered 200 steel underframe ballast cars of 100,000 lbs. capacity from the Rodger Ballast Car Co., to be built by the American Car & Foundry Co., for March to May, 1907, delivery; and twelve 70-ft. coaches, four 70-ft. baggage and mail cars and four 60-ft. baggage cars from the Pullman Co., for January and February, 1907, delivery. Orders for 20 cabooses are still pending.

The Northern Electric Company, Chico, Cal., has ordered two passenger and two combination passenger and express cars from the Niles Car & Manufacturing Co. All cars will be 56 ft. long, 9 ft. 1/4 in. wide and 12 ft. 11 in. high, over all. The special equipment for both includes:

Brakes	Westinghouse
Couplers	Gould
Curtain fixtures	Curtain Supply Co.
Curtain material	Pantasote
Draft rigging	Gould
Heating system	Gold
Journal boxes	"Positive"
Light	Anderson & Smith
Trucks	Baldwin
Wheels	Schoen steel tired

The Delaware, Lackawanna & Western is building at its Scranton shops 300 box cars of 60,000 lbs. capacity, for February and March delivery. These cars will weigh 35,000 lbs. and will measure 40 ft. 1 in. long, 9 ft. 7 in. wide and 13 ft. 7 in. high, over all, and 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements. They will have wooden bodies and steel underframes. The special equipment includes:

Bolsters	Body, Commonwealth; truck, Simplex
Brake-beams	Pennsylvania
Brake-shoes	Lappin
Brakes	Westinghouse
Brasses	Magnus
Couplers	Gould
Door fastenings	"Positive"
Doors	Climax fixtures
Draft rigging	Miner tandem
Paint	Sherwin, Williams & Co.
Springs	Simplex Railway Appliance Co.
Trucks	Arch bar, Barber Roller Bearing

The Pennsylvania has ordered for the Lines East of Pittsburgh 4,000 all steel hopper, class GLA, gondolas, and 1,000 steel underframe, class GR, gondolas, with wooden bodies, from the Pressed Steel Car Co.; 2,800 class GLA gondolas from the Cambria Steel Co., and 1,000 all steel class GSD gondolas from the Standard Steel Car Co. For the Lines West of Pittsburgh the company has ordered 1,000 class GR gondolas with steel underframes and wooden bodies, 930 class XL box cars with steel underframes and wooden bodies, and 400 class FM flat cars with steel underframes from the Pressed Steel Car Co.; 300 all steel class GSD gondolas with cork racks, and 785 class GSD all steel gondolas without cork racks from the Standard Steel Car Co. This is a total of 12,215 cars, and an order for 200 additional cars will be placed shortly. All cars are of 100,000 lbs. capacity, and deliveries are to be made between March and November, 1907.

The Duluth & Iron Range, as reported in our issue of August 3, has ordered 400 hopper bottom steel ore cars of 100,000 lbs. capacity from the Pressed Steel Car Co., for April, 1907, delivery. These cars will weigh 32,000 lbs. and measure 20 ft. 4 in. long, 8 ft. wide and 9 ft. high, inside measurements. The special equipment includes:

Bolsters	Simplex
Brake-beams	Pressed Steel Car Co.
Brake-shoes	Streeter
Brakes	Westinghouse
Couplers	(300 cars) Latrobe; (50) Major; (50) Climax
Draft rigging	(300 cars) Westinghouse; (50 cars) Sessions; (25 cars) McCord; (25 cars) Waugh
Dust guards	Franklin
Journal boxes	McCord
Paint	Illinois Steel Co.
Springs	Pittsburg Spring & Steel Co.
Trucks	(300 cars) Pressed Steel Car Co.; (100 cars) Andrews
Wheels	(300 cars) Griffin; (50 cars) Schoen; (50 cars) Davis

RAILROAD STRUCTURES.

ASHTABULA, OHIO.—The Pennsylvania has given a contract to the Pittsburg Construction Co. for its new No. 10 dock at Ashtabula, Ohio. This dock is to be 800 ft. long, and about 400 ft. wide. Modern ore and coal handling machinery are to be put in on the concrete foundation.

BRANDON, MANITOBA.—The Canadian Northern has bought land on Ninth street, directly north of its present terminal, as a site for its new station.

CHARLOTTETOWN, P. E. I.—The Department of Railways and Canals, Ottawa, will shortly call for bids for railroad shops to be built at this place.

CORNELIA, GA.—The Southern, it is said, will put up a new passenger station here.

KANANASKIS, B. C.—The Canadian Pacific is putting in several new steel bridges here.

LONG BEACH, CAL.—The Southern Pacific has begun the construction of a new passenger station 30 ft. x 66 ft.

LOS ANGELES, CAL.—The Southern Pacific has completed plans for a new shop, two story brick structure, with steel roof trusses, 115 ft. x 88 ft.

MEDINA, N. Y.—Plans, it is said, are under way to build a brick or stone passenger station.

MENOMINEE, MICH.—It is said that the Chicago & North-Western will put up a new passenger station here next year.

MONTREAL, QUE.—Announcement is made by the Canadian Pacific that it will build a large car and locomotive shop here.

PITTSBURG, PA.—Work, it is said, will soon be started by the B. & O. on a new terminal station here.

PORT ARTHUR, ONT.—A steel highway and street railroad bridge is to be built at the foot of Arthur street over the Kaministiquia river, with a substructure of concrete and stone, to cost \$141,000. Bids are to be called for at once. H. Sydney Hancock is City Engineer, and Jas. McTeigue, City Clerk.

SALAMANCA, N. Y.—The Erie, it is said, will make extensive improvements, to include a new freight house, transfer platform and change of tracks, at a cost of \$75,000.

SAN DIEGO, CAL.—The Santa Fe will double the present size of its wharves and warehouses at this place in preparation, it is said, for the increase of business expected after the opening of Tehuantepec Railway and the calling three times a month of the steamers of the American-Hawaiian line which run to the isthmus of Tehuantepec.

SEDALIA, MO.—The Missouri, Kansas & Texas paint shop, with 11 cars, including the private car of A. A. Allen, Vice-President and General Manager, were destroyed by fire September 18; loss about \$100,000.

TOPEKA, KAN.—Announcement is made that the Atchison, Topeka & Santa Fe will make this place the manufacturing center of its system, and in addition to the new shops recently put up will put up some large additional ones, for which 11 acres of ground have recently been bought as a site.

TORONTO, ONT.—A steel and concrete bridge for highway and street railroad is to be built at the foot of Bay street, to cost about \$200,000, in connection with the new Union Station. C. Rust is City Engineer.

WEST MILWAUKEE, WIS.—The Chicago, Milwaukee & St. Paul is to expend \$300,000 in enlarging and improving its shops.

WATERVILLE, ME.—The Maine Central has given a contract to H. Burinton & Co. for building an extension to its repair shops here. An addition is also to be made to the roundhouse.

WINNIPEG, MAN.—Bids are wanted by J. G. Latimer, Chairman of the Committee on Works, Oct. 16, for the stone and concrete substructure, and on Nov. 20 for the steel superstructure of a combined highway and street railroad bridge to be built over the Red river between this place and St. Boniface, to cost \$175,000. Col. Ruttan is the engineer in charge, and C. J. Brown, City Clerk.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA CITY, GADSDEN & ATTALA (ELECTRIC).—A meeting of the stockholders of this street railway in Birmingham has been called for October 15th, to consider the question of issuing \$300,000 of first mortgage bonds to buy new equipment and to extend the line. The question of building a line from Gadsden about seven miles long to Noccalula Falls is under consideration.

BROWNSVILLE, HIDALGO & NORTHERN.—This company, it is said, will probably let contracts soon for building its proposed line from Brazos Santiago, Tex., west via Brownsville to Hidalgo, 84 miles. Surveys have been completed and nearly all the right of way secured. Grading work will be heavy. (See Construction Record.)

BUFFALO, ROCHESTER & PITTSBURG.—Estimates have been completed by this company for double-tracking its line from Punxsutawney south to Indiana, Pa., 37 miles. As soon as the bids are received and acted upon work will be started.

CAIRO & THEBES.—Organization has been completed of the Cairo Construction & Dredging Co., of which J. B. Magee is President, and which has a contract for work on this line. The company is to do 30,000 cubic yards of earth filling for the Cairo Terminal, and as the railroad has about 1,000,000 yards to do, the company

expects to secure large additional contracts upon the completion of the first one. The work includes the pumping of sand from the Mississippi river into the City of Cairo. Part of this will have to be done through a pipe a mile long. (July 13, p. 10.)

CANADIAN PACIFIC.—This company, as shown by its annual report just issued, has 924 miles of road under construction divided as follows:

ONTARIO DIVISION.

Toronto-Sudbury line, Bolton to Romford, 226 miles.
Guelph & Goderich, Guelph to Goderich, 80 miles.

CENTRAL DIVISION.

Pheasant Hills branch, Strassburg north 40 miles; Saskatoon east 40 miles; Saskatoon west 156 miles.
Wolsley branch, Wolsley to Reston, 122.4 miles.
West Selkirk branch, Winnipeg Beach to Gimli, 9.3 miles.
Stonewall branch, Teulon, north 20 miles.
Moosejaw branch, Moosejaw, northwest 50 miles.
Souris branch, Lauder, east six miles; Lauder to Jackson Creek, 27 miles.
Manitoba & North-Western, Yorkton extension, Sheho, northwest 37 miles.
Bredenbury branch, Bredenbury, south one mile.

WESTERN DIVISION.

Crows Nest Pass line, Yahk branch, Yahk to boundary, 8.3 miles.
Calgary & Edmonton, Wetaskiwin extension, 48.5 miles; *Lacombe extension*, 50 miles.

PACIFIC DIVISION.

Columbia & Western, Midway, west 2.2 miles.

Many of the branch lines are nearing completion. The Guelph & Goderich is about finished. Work on the Toronto & Sudbury is well advanced. The branch from Wolsley to Reston will be finished this autumn. Grading is being done in both directions between Sheho, Strassburg and Wetaskiwin to connect with the Manitoba & North-western line. The Calgary & Edmonton will build the expensive bridge over the Saskatchewan river according to the terms of the agreement made some time ago. A new line is to be built from Peterboro, on the Ontario & Quebec Division, to Victoria Harbor, 96 miles. By this route the distance from Montreal to Georgian bay will be 358 miles as against 449 miles by the present Owen Sound route, and the grades will be much more favorable. The company will enter into an arrangement with the Georgian Bay & Seaboard Railway to construct this line and to lease it to the Canadian Pacific for 999 years.

The shareholders are to authorize the issue of 4 per cent. bonds to provide funds for building branch lines, and to sanction the lease of the Walkerton & Lucknow Railway, extending from Proton, on the Toronto, Grey & Bruce line, to Walkerton, Ont., about 37 miles.

The company will begin work this fall on a branch from Flesherton to Southampton, Ont.

CAROLINA MINERAL.—The first section of this line, from the Seaboard Air Line to the property of the Colosses Gold Mining & Milling Co., is reported as likely to be ready for operation next month. Contracts for the remainder of the line, which is to have a total length of about 40 miles, from Lancaster, S. C., to Charlotte, N. C., are to be let next year. Surveys are being made and right of way secured. (Sept. 7, p. 62.)

CHICAGO & ILLINOIS WESTERN.—This company, which operates 17 miles of line from Chicago southwest, has made surveys and secured right of way for 37 miles additional, and will soon build an extension southwest via Desplaines to Joliet.

CHICAGO & NORTH-WESTERN.—This company has opened for traffic the extension of the Wyoming & Northwestern from Shoshone to Arapahoe, 45.02 miles. Arapahoe is about 18 miles east of Lander, the proposed western terminus of the road. There are six stations on this extension, Shoshone, Minifield, Wahaba, Walsworth, Arapahoe and Alto.

CHICAGO, MILWAUKEE & ST. PAUL.—In the report of this company for the year ending June 30, 1906, the statement of President A. J. Earling in part is as follows: New lines include an extension from Chamberlin to Rapid City, S. Dak., 219 miles, of which 76 miles were completed at the close of this year. The line from Madison to Renner, S. Dak., now under construction, and which is to be 34 miles long, has been completed for about 19 miles. About 21 miles have been finished on the extension of the Armour branch to Stickney, S. Dak. On the Gleason branch, in Wisconsin, about six miles were completed. The company also bought a line running from Oglesby to Granville, in Illinois, 11 miles. A second main track is now being built on the La Crosse division from Watertown Junction to Portage, Wis., 47 miles; also on the River division from River Junction to Richmond, Minn., 10 miles; and from Lake City to Wabasha, Minn., 12.50 miles. Grades are being reduced, the alinement changed at various points on the Chicago

& Council Bluffs divisions in Iowa; also on the Chicago & Milwaukee division and the River division. Work is practically completed elevating the tracks used jointly with the Pittsburg, Cincinnati, Chicago & St. Louis from Western avenue, Chicago, to Elizabeth street, and also the tracks of the company between Western avenue and Grand avenue. At Escanaba an additional ore dock 1,440 ft. long has been completed. Improvements were also made to shops during the year at an aggregate cost of \$414,661. No mention was made in the report of the Pacific coast extension.

It is understood that the engineering department has decided to adopt a line through the Bitter Root mountains at Saltese, Mont., to reach the Spokane district. Preliminary surveys show a 2 per cent. grade, but this will be reduced, and the curvatures will be less than 10 deg. The Northern Pacific goes over this summit at an elevation of 4,900 ft., but the Milwaukee makes a tunnel at 4,050 ft. The line is to run in the St. Joe valley, southeast of Spokane.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—The report of this company for the year ending June 30, 1906, shows that the company is extending the Hartington branch in a northwest direction from Hartington, Neb., to Crofton, 15.33 miles. This work is to be completed during the present year.

On the line from St. Paul to Duluth the company has laid a second track from Spooner north to Superior Junction (now Trego) about five miles. Second track work is also in progress from the passenger station at Duluth, Minn., to the St. Paul River bridge, 1.83 miles; from Merrillan to Augusta, Wis., 22.10 miles, and between east St. Paul and the new yard at Harvester Works, 3.20 miles, two additional main tracks for freight service are being put in. The company has completed a new yard north of Plymouth avenue, Minneapolis, and work is now in progress on a new freight yard near the Harvester Works, at St. Paul. Of the change of line mentioned in the last report, the company has completed and put in operation that between Roberts and Hammond, Wis.; that through Lake Crystal, Minn.; between Bingham Lake and Windom, Minn.; on a section west of Carnes, Iowa, and expects to complete before the close of this year between Ottawa and St. Peter, Minn., and at Minneopa, Minn. Work has been commenced on a change of line between Minneopa and Lake Crystal, where the change is to be 1.37 miles in length and will reduce the curvature 49 deg., 44 min. New stations were put up at Northline and Menomonie City, Sarona, Arnold, Haywood and Eagle Point, Wis.; Mendota, Minn., and at Lyons, Neb. A pile dock 1,002 ft. long is under construction at Itasca, Wis. The length of wooden bridging has been decreased 1,579 ft. as follows: By filling 483 ft., by putting up steel bridges on masonry 80 ft., and by iron pipe culverts and filling 1,016 ft.

The net increase in the length of side and passing tracks was 10.16 miles, and old rails were replaced with new rails on 59.45 miles of track.

COLORADO & SOUTHERN.—The report of this company for the year ending June 30, 1906, outlines a plan for reaching tidewater at Galveston, Tex., by buying and building as follows: Trinity & Brazos Valley from Cleburne, Tex., to Mexia, 79 miles. Extension of that road now in progress, which is to be completed in November, to Belt Junction near Houston, Tex., 157 miles; trackage rights for the same road over the Gulf, Colorado & Santa Fe from Fort Worth to Cleburne, 28 miles, and from Houston to Galveston, 53 miles; a total of 317 miles. This will provide the shortest through line between the Rocky Mountain section and tidewater. In addition to the above the Trinity & Brazos Valley is building a line from Teague, 14 miles southeast of Mexia, north to Waxahachie, 67 miles, which is to be finished by the first of next year. By a trackage contract over the Missouri, Kansas & Texas from Waxahachie to Dallas, 31 miles. This will make the shortest line from Dallas to Galveston, as well as the shortest line between Fort Worth and Galveston. The company during the year has secured the Colorado Springs & Cripple Creek District Railway, 75 miles, and the Fort Collins (Colorado) Development Railway, 16 miles. It has nearly completed negotiations on satisfactory terms to buy the Wichita Falls & Oklahoma, operating from Red River to Wichita Falls, Tex., 22 miles; also the Wichita Valley Railway, extending from Wichita Falls to Seymour, Tex., 53 miles. It is also intended to buy the following roads now under construction: Wichita Valley from Seymour, Tex., to Stamford, 60 miles, and the Abilene & Northern from Stamford to Abilene, 38 miles, a total of 173 miles. The company with all these lines will have approximately 2,250 miles of road, besides its half interest in the Colorado Midland, which operates 336 miles. A contract has been entered into with the Rock Island Co. whereby the latter has taken a half interest in the Trinity & Brazos Valley.

DENVER & RIO GRANDE.—Contracts, it is said, are to be let by this company for double-tracking the line from Adobe, Colo., west to Cannon City, 12 miles; also from Adobe east to Swallows, 13 miles.

EAGLE VALLEY.—President David Eccles, of the Sumpter Valley

and the Ogden & Northwestern, at Ogden, Utah, is quoted as saying he will take over the Eagle Valley project, promoted by W. L. Vinson, and build a line from Baker City, Oregon, east to the Snake river, 75 miles. It is said that Baker City has raised a bonus of \$100,000.

ESSEX COUNTY TRACTION.—Incorporated in New York with \$1,500,000 capital to build an electric line from Westport on Lake Champlain west to Newman, in Essex County, N. Y., 49 miles. The Directors include A. S. Washburn and N. C. Spencer, of Hartford, Conn.; W. L. Kiley and George S. Raley, of Glen Falls, and R. L. Trumbull, of Ausable, N. Y.

GRAND TRUNK PACIFIC.—The National Trans-Continental Railway Commission will shortly ask bids for the construction of about 200 miles of road east and west from Lake Abitibi, Ont.

GREAT NORTHERN.—See Portland & Seattle.
See Vancouver, Victoria & Eastern.

GREENWICH & JOHNSVILLE.—An officer writes that this company is extending its line from Greenwich, N. Y., northeast via Battenville and Center Falls to a connection with the Salem & Washington County branch of the Delaware & Hudson at Rexleigh, 10 miles. There are about 150 men and 40 teams now at work on the grading. Contracts for bridges and for concrete work have not yet been let. There are to be four or five steel bridges. The work is to be pushed to completion, so as to have the line in operation by January. The new line will be known as the Salem branch of the G. & J.

GURLEY & PAINTROCK VALLEY.—Organized in South Dakota with \$15,000 capital by the Cleveland Coal & Iron Co., which has bought 30,000 acres of coal lands in the Paintrock Valley, Jackson county, Alabama, to build a line nine miles long from Gurley, along the route of the old Gurley & Paintrock Valley, surveyed and largely graded some time ago. George E. McNeil is President, and J. D. Austin, Secretary, Treasurer and General Manager, both of Chicago.

INTEROCEANIC.—The Teziutlan branch of this road is being extended from Teziutlan to the port of Nautla, which is about midway between Vera Cruz and Tuxpan, and said to be one of the best natural ports in Mexico.

KEYSTONE AIR LINE (ELECTRIC).—A charter has been applied for in Pennsylvania by a company under this name with \$450,000 capital, for the proposed trunk line to be built by Joseph Ramsey, Jr., and associates across the state of Pennsylvania. The application states that the proposed Indiana, Clearfield & Eastern, to be 25 miles long in Indiana and Clearfield counties; the Allentown, Tamaqua & Ashland, 50 miles, in Lehigh and Schuylkill counties, and the Brush Creek & Crow's Run, 10 miles in Beaver county, have arranged to build extensions so that they will connect and form the through line. (See New York, Pittsburg & Chicago Air Line, Aug. 17, p. 45.)

LOUISVILLE & NASHVILLE.—An appropriation, it is said, has been made by this company to be used for straightening, double-tracking and leveling its main line for nine miles between Oxmoor and Helena, south of Birmingham, Ala. A contract is also reported let to W. J. Oliver, of Knoxville, Tenn., for work on 25 miles of road near Birmingham, Ala., between Hardy and Grace, to include a double-track tunnel.

MEXICAN ROADS.—We are told that a company is being organized to carry out the work under the concession recently granted to Gualterio C. Palmer, of Zacatecas, to build a line from Gutierrez west via Sombrerete Chaichihuites to Durango, about 190 miles. Contracts for grading, track laying, etc., are to be let about Jan. 1, 1907. The work will be light; maximum grades will be 1½ per cent., with 5 deg. curves. There are to be 10 to 15 bridges but no tunnels.

MISSOURI, ARKANSAS & SOUTHWESTERN.—This company has completed surveys and secured right of way for 30 miles of the line which it is building from Batesville, Ark., on the St. Louis, Iron Mountain & Southern, northeast to Black Rock, on the St. Louis & San Francisco, 52 miles. B. I. Brookfield, of Jonesville, Ark., is Chief Engineer.

NORFOLK & WESTERN.—The new lines, extensions and work under way by this company, according to its yearly report, include the following: Blackstone & Sunenburg, south from Blackstone, Va., 5.75 miles to lumber mills on the south side of Nottoway river; to be put in operation next month. The Speedwell extension, 5.28 miles, a branch of the North Carolina extension, has been completed. This extension is now 16.41 miles long, extending from Ivanhoe, Va., to the large iron deposits at Speedwell and Cripple Creek. The construction of 3.70 miles of the Pocahontas & Western from Pocahontas, Va., up Laurel Creek has been completed this year, and the construction of 4.50 miles is to be carried out later. The Clear Fork branch from Gordon, W. Va., south has been extended 1.27 miles, and is now 11.20 miles long. The final revisions

along the Guyandot and Tug rivers have been completed from the mouth of Pinnacle Creek on the Guyandot river to the mouth of Gilbert creek on the same river, thence to the west terminus of the line at Wharnccliffe, W. Va. The Big Stony Railway, which is operated independently, 10.68 miles long, extending from Ripplemead, Va., to Interior, is to build an extension from the latter point to the West Virginia state line, 6.25 miles, and the Interior & West Virginia is authorized to build a line from the terminus of the above extension of the Big Stony through Monroe County to the Virginia state line, 17.55 miles. The Virginia & Potts Creek is authorized to build from the terminus of the Interior & West Virginia down the Valley of Potts Creek through Craig County, Va., to Potts Creek, in Alleghany County, 11.15 miles. The building of the above would enable the N. & W. to reach extensive ore deposits in the Potts Valley by building a connection with the Big Stony, which would furnish supplies for the Virginia furnaces along its line. The Big Creek branch near Richlands, Va., has been extended 1.18 miles to a new coal field, and is now 7.08 miles long. The Lick Fork branch, 0.92 miles long from a point east of Thacker to the Red Jacket Consolidated Coal mines, has been acquired by the N. & W. and extended, its present length being 2.79 miles. The Iaeger & Southern, which is controlled by the N. & W., and is now operated as the Dry Fork branch, was extended 23.21 miles up Dry Fork, and now has a total of 28.11 miles. This line was put in operation last April to Berwind. A further extension up Dry Fork to the upper plant of the New River & Pocahontas Consolidated Coal Co., with new yard facilities, is under construction. On the Big Sandy low grade line the permanent arching of tunnels, and the construction of stone arch masonry has been finished.

The report shows that the following work has been authorized and is now under construction: Forest branch, 7.60 miles; Concord branch, 14.52 miles from the Durham line, and a revision line with second track from Forest to Montvale, 26.60 miles. These two lines are to furnish a low grade line from Concord to Forest, and will be operated in connection with the existing line as a double-track between these points. The company is also carrying out the revision of its line with second track from Eggleston to Pembroke, six miles, which includes three tunnels, and from Welch to Davy, 7.20 miles, nearly completed. Second track from Davy to Claren, three miles; from Wilmore to Iaeger, 4.10 miles, and from east Ironton to Hanging Rock, 5.60 miles. Work is also well advanced on the storage and assembling yards at South Norfolk, as also on extensive enlargements of the yards at Roanoke, Bloomfield and Williamson. Extensive additions are to be made to the Roanoke and Portsmouth shops in both the locomotive and car departments. The company is also considering improvements, which have not yet been started, including the continuation of the double-track system between Walton and Pearisburg, aggregating 18.79 miles, and the costly and heavy work, to include many tunnels, from Vivian to Thacker, between which places 50.40 miles of line are to be revised and double-tracked. On the completion of the above, the company will have a continuous double-track with easy grades and curves from Concord, Va., to Kenova, W. Va., 377 miles. A large number of additional passing tracks at various points, new equipment and further enlargements of the shops at Roanoke, Bloomfield and Portsmouth are also included.

NORTHERN PACIFIC.—The new second main track from Mapleton, N. Dak., west to Casselton, seven miles, is now in use. It is expected that the line from Mapleton east to Haggart, six miles, will be finished this month, completing the double track from Fargo west to Casselton.

OPELOUSAS, GULF & NORTH EASTERN.—See Texas & Pacific.

OREGON RAILROAD & NAVIGATION.—Official announcement is made that the new line between Riparia and Lewiston, Ida., will be opened Jan. 1, 1907.

PENNSYLVANIA.—A contract is reported let by this company to D. F. Keenan, of Philadelphia, for building an extension of the Monongahela & Washington division from Ellsworth to a point on Daniel's Run, 10 miles. The work will be unusually heavy and calls for the excavation of about 1,000,000 cubic yards of earth and the building of 70,000 cubic yards of complete masonry. The work, it is said, will cover a period of two years.

Announcement is made that the Philadelphia & Erie division is to be double tracked between Wilkesbarre and Sunbury, 64 miles.

PORTLAND & SEATTLE.—This line, which is being built jointly by the Northern Pacific and the Great Northern, is not to cross the Spokane river east of Spokane, but will continue to follow the 2,000 ft. elevation and connect with the Northern Pacific main line at Trent, north of the river.

QUEBEC BRIDGE & RAILWAY.—At the annual meeting of this company Sept. 4, the Engineer's report showed that the bridge across the St. Lawrence river extends from the south shore abutment to a point about 200 ft. beyond the main pier, a total distance of

about 900 ft. Wharves are being built on the north shore for the reception of material for the false work and traveler. These fixtures, used at present on the south shore, are to be removed this fall after the cantilever arm is erected.

SACRAMENTO VALLEY & EASTERN.—This company is to build a line from a point near Kennett, Cal., along Pit river to Squaw creek, and thence 16 miles to copper mines. The work will be through a rocky section, and will include a good deal of heavy side hill cutting. F. J. Dearborn, of Winthrop, Cal., is Chief Engineer.

SOUTHERN.—Announcement is made by this company that contracts are to be let for the construction of a line from Pineville, Ky., northeast to Harlan, 25 miles. Surveys were made about a year ago.

SOUTHERN PACIFIC.—A press despatch from San Bernardino says that the Southern Pacific has now decided to at once rebuild its line in the Salton Sink for about 50 miles, and on a grade 30 ft. higher than the present line; thus, it is believed, putting the railroad forever out of danger from the rising waters of the "sea" which is being formed by the overflow of Colorado river. Many gangs of men have already been put at work on the grading of the new line.

TEMISKAMING & NORTHERN ONTARIO.—Bids are wanted October 2 by H. W. Pearson, Secretary of the Commission which manages this road for the Ontario Government (25 Toronto street, Toronto, Ont.), for grading three branch lines as follows: From the main line near Cobalt to the Kerr Lake region, four miles; from the main line to a point near Haileyburg Wharf, 1.75 miles, and from the main line near Englehart to Charleton, eight miles.

An additional 25 miles of this road has been completed and will be opened on Oct. 1.

TEXAS & PACIFIC.—This company guarantees the bonds secured by the \$5,000,000 mortgage made last spring with the Mercantile Trust Co. of New York, as trustees, of the Opelousas, Gulf & North Eastern. This road is projected to run from Opelousas, La., northeast to a point near the Mississippi river and southwesterly from Opelousas to the Gulf of Mexico. It is now under construction from Melville to Crowley, 60 miles.

UNION PACIFIC.—For the Washington & Northern, which this company is to build from Portland, Ore., north to Tacoma, Wash., bids are now being asked. The contracts are to be let in sections, and will call for the completion of the work by Jan. 1, 1908. The line has been definitely located from Kelso north of the Columbia river north to Chehalis. Between the latter place and Tacoma alternative surveys have been made, and a definite location will soon be made. The line will generally follow the Northern Pacific between Vancouver and Tacoma, and will cross that company's road several times.

VANCOUVER, VICTORIA & EASTERN.—The work on this line presents one of the most difficult pieces of railroad building in the Pacific northwest. There is a fall of more than 2,800 ft. in nine miles. Midway, north of Spokane, has an elevation of 2,000 ft. above the sea level; Molson, Wash., at the summit of the mountain, is 3,703 ft., and Oroville, Wash., 900 ft. The distance between Oroville and Molson is nine miles air line, but it has been found necessary to build 27 miles of line to connect the two towns. Work on the Similkameen valley extension will begin about the middle of October.

WASHINGTON & NORTHERN.—See Union Pacific.

WASHINGTON, BALTIMORE & ANNAPOLIS (ELECTRIC).—This company, which is building an electric line from Baltimore to Washington, 31 miles, with a branch to Annapolis, 14½ miles, has completed grading for half the distance and proposes to secure an entrance into Baltimore through the Baltimore Terminal Co., incorporated in Maryland with a capital of \$1,500,000. The terminal company is building a line from a junction with the proposed line of the W., B. & A. near Clifford Junction north to Baltimore. The terminal company has secured a franchise in the city and nearly all the necessary right of way. It will build four and a half miles of double track, two and a half of which will be within the city limits. It is expected that both projects will be completed and the lines in operation by July of next year.

WESTERN PACIFIC.—This company has filed with the Board of Supervisors plans showing the exact route proposed to be followed within the city limits of San Francisco. The road will enter the city at the intersection of Twenty-fifth and Water Front streets, and run in a generally northeasterly direction through the Potrero Hills, terminating at Ninth and Bryant streets, where its main passenger station is to be situated. Near Nineteenth street and Arkansas the line runs through a tunnel and passes through the Potrero hills for 10 blocks, emerging in block 299 just after passing beneath Mississippi street.

The tracks of this company in Utah have been extended 51 miles to the westward from Salt Lake City, and construction is

progressing steadily. As a result of new surveys it has been decided to reduce the length of the proposed tunnel through the Pequop range in Nevada from 12,000 ft. to 6,500 ft. The contract for the construction of the tunnel is expected to be let soon.

WISE TERMINAL.—This company, which operates six miles of road in Virginia, is making surveys for extending the line north from Glamorgan, Wise County, to the Kentucky state line, about 15 miles. (See Construction Record.)

WYOMING & NORTH-WESTERN.—See Chicago & North-Western.

RAILROAD CORPORATION NEWS.

CHICAGO UNION TRACTION.—See Northern Chicago Street Railroad.

CLEVELAND, AKRON & COLUMBUS.—This company, which is controlled by the Pennsylvania Company, has declared a semi-annual dividend of 1½ per cent. on its \$4,000,000 capital stock. The previous rate has been 2 per cent. annually.

GRAND TRUNK WESTERN.—It is said that this company will pay, out of its earnings of the fiscal year ending June 30, 1906, the full interest on its \$1,500,000 second mortgage 4 per cent. income bonds, on which only 1 per cent. was paid from the earnings of the previous year.

INTERBOROUGH RAPID TRANSIT.—The New York State Railroad Commission has given the Manhattan Railway permission to issue \$4,800,000 additional capital stock for construction and equipment, making \$60,000,000 outstanding, this being the total amount authorized. The company owns all the elevated railroads, 38 miles of main line, in the boroughs of Manhattan and the Bronx, New York City, and the road is leased to the Interborough Rapid Transit, which guarantees 7 per cent. annual dividends on the stock.

The New York & Queens County, which operates 40 miles of main line electric road in and about Long Island City, N. Y., and whose entire capital stock is owned by the Interborough Rapid Transit, has been given permission to make a mortgage for \$10,000,000, of which \$8,000,000 can be issued now. Of this latter amount, \$2,000,000 is for refunding existing mortgages, and the remainder is for building a new power house, equipment and the rebuilding of part of the road. There is already outstanding \$3,000,000 in bonds of various kinds.

KANSAS CITY SOUTHERN.—This company has issued \$600,000 series "B" 4½ per cent. equipment notes payable in 20 semi-annual instalments, beginning December, 1906. The New York Trust Company is trustee, and the notes are secured on 15 consolidation locomotives, 200 steel gondolas, 100 tank cars and 10 cabooses.

MANHATTAN RAILWAY.—See Interborough Rapid Transit.

MARICOPA, PHOENIX & SALT RIVER VALLEY.—A judgment of foreclosure has been rendered against this company for the \$771,178 due on the \$540,000 6 per cent. and the \$78,000 5 per cent. bonds. The company operates 36 miles of road from Maricopa, Ariz., to Phoenix, and a seven mile branch from Tempe to Mesa. The \$1,000,000 capital stock is all owned by the Southern Pacific Company.

NEW YORK & QUEENS COUNTY (ELECTRIC).—See Interborough Rapid Transit.

NORFOLK & SOUTHERN.—A special meeting of the stockholders has been called for October 16th to vote upon a proposition to increase the capital stock from \$2,000,000 to \$3,000,000, and to authorize additional increases from time to time as may be required.

NORTHERN CHICAGO STREET RAILROAD.—A bondholders' committee consisting of N. W. Harris, D. M. Cummings, A. B. Forbes, A. K. Boisot and G. P. Hoover has been appointed to protect the interests of the holders of the 4½ per cent. refunding gold bonds of this company.

PENNSYLVANIA COMPANY.—See Cleveland, Akron & Columbus.

PORTLAND & RUMFORD FALLS.—Gross earnings for the year ended June 30, 1906, were \$690,813, an increase of \$32,150; net earnings \$330,470, an increase of \$49,767. Surplus after dividends and charges \$116,376, an increase of \$12,370.

SOUTHERN PACIFIC.—See Maricopa, Phoenix & Salt River Valley.

TOLEDO, PEORIA & WESTERN.—The gross earnings for the year ended June 30, 1906, were \$1,293,394, an increase of \$11,951; net earnings, \$206,569, an increase of \$2,167. Deficit after charges \$21,642, a decrease of \$11,230.

WISCASSET, WATERVILLE & FARMINGHAM.—The foreclosure sale of this company's 42 mile narrow gage road from Wiscasset, Me., to Albion, has been postponed until October 24, 1906. It has been in the hands of a receiver since Oct. 7, 1905.

